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CAMPBELL TIMBER SALE

Final Environmental Impact Statement





Campbell Timber Sale

Final Environmental Impact Statement

Record of Decision

USDA - Forest Service

Alaska Region

Alaska

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Record of Decision

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Background

The purpose and need for this project is to consider specific alternatives to harvest timber within the project area given the guidance in the Tongass Land Management Plan which presently directs us to manage the area for timber production. The need for harvesting timber and managing future timber production is to provide wood products and the opportunity for timber related jobs. According to the Forest Plan, the project area presently has areas that can support the production of timber over time while meeting scenic quality objectives, wildlife and fishery habitat needs.

Decision

This Record of Decision documents my decision to make timber available from the Campbell project area. My decision consists of the location and design of timber harvest units, the location and design of the transportation system including Log Transfer Facilities and the necessary monitoring, mitigation measures and enhancement opportunities.

It is my decision to select **Alternative P** as described in Chapter 2 of the Final EIS. This decision is responsive to issues raised during scoping and public responses to the Draft EIS. My decision will authorize the harvest of **approximately 11.6 Million Board Feet of timber on 476 acres**. Harvest of timber will occur in 15 units harvested by overstory removal methods. This project will leave approximately one-quarter to one-third of the trees in the harvest areas. The selected alternative includes no roads but does include the construction of one Log Transfer Facility and sort yard on the West Face of the project area. This Record of Decision adopts mitigation measures expected to reduce or eliminate adverse environmental effects of the timber harvest and Log Transfer Facility activities which apply to the selected alternative, as specified in Chapter 2 of the FEIS. Appendix B of the Final EIS presents the monitoring that will be conducted.

Reasons for Decision

In making my decision, I tried to strike a balance and ensure the consideration of all issues and competing values for the project area. I also took into consideration the needs to keep important ecosystem functions operating since these are the building blocks for future options. Public land managers face an increasing challenge to supply a growing national demand for jobs and wood fiber while at the same time managing ecosystems to provide aesthetic, wildlife and fishery resources. I believe we have met that challenge in the Campbell project area by the selected alternative while at the same time trying new harvest methods that may be applicable to other equally difficult landscapes we manage. The selected alternative does not propose any clearcutting.

I formulated the selected Alternative, Alternative P, based on comments from the public and state and federal agencies on the Draft EIS. In developing Alternative P, I modified Alternative F to include some of the best qualities of Alternative D. These elements of Alternative D were brought up several times in public comment (ie. no roads and one Log Transfer Facility). I also dropped three units within high value, goat winter range habitat.

Like Alternative D, the selected alternative has lower water quality impacts and lower impacts to brown bears, fish and marine life due to the absence of roads and elimination of the Frank Creek Log Transfer Site. I have decided that the development of a land based sorting and log transfer area on the West Face is necessary in order to make the harvest logistics feasible. The development of this site will have minimal effects on water quality or marine life due to its design, location and the low volume of the sale. The presence of this site will result in increased flexibility and efficiency in the harvest operations.

Units #1, #2 and the west half of unit #3 were dropped in the formulation of the selected alternative. I believe that this strategy adequately responds to the need to protect this type of goat habitat within the Wildlife Analysis Area (WAA) and within the project area (VCU). The selected alternative would harvest only 19 acres from the fringes of the largest contiguous 660 acre block of high value goat habitat in the saltwater-facing portion of the WAA. I believe that potential utilization of this block, particularly during heavy snow years, is preserved. The selected alternative would leave 97% of the total acres of high value habitat in the WAA and 91% of the total acres of high value habitat in the project area.

I was also concerned about the scenic and recreation values of the Bradfield Canal area. I believe my decision provides for the continuation of many of the established uses of the area because of Alternative P's reliance on helicopter, overstory removal harvest methods, lack of roads, and no harvest in the Tom Creek area. Although some people may notice the harvest areas they will not be in stark contrast to the surrounding landscape. In addition, the pattern of human use will remain virtually the same. This will protect wildlife and fishery values as well as primitive and semi-primitive recreation experiences which I believe will continue to be in demand on a national, regional, and local scale.

For a comparison of how each alternative responds to the issues, see the tables included in both the Summary and at the end of Chapter of the Final Environmental Impact Statement.

Public and Other Agency Involvement

We began the public notification process by publishing a Notice of Intent in the Federal Register on April 21, 1992. We also mailed over 300 individuals and agencies a letter describing the proposed action, project location and tentative issues. The week of August 5th, 1992 we conducted a four day "open house" so the general public could discuss the issues and preliminary alternatives with us on a more informal basis. Periodically, we also met and spoke informally with individuals and interested organizations.

In July and August, 1992 we conducted two field trips to the study area with representatives from the Alaska Department of the Fish and Game, Fish and Wildlife Service and Alaska Department of Environmental Conservation. Biologists from the Fish and Wildlife Service and the National Marine Fisheries surveyed the proposed Log Transfer Sites. Meetings and phone conversations also took place throughout the project planning process with other agencies. Chapter 6 of the Final EIS identifies the agencies that were informed of and/or involved in the planning process.

Alternatives

Only one alternative was considered but eliminated from detailed study. This alternative proposed harvest only within the Tom Creek watershed. This alternative was designed to minimize forest fragmentation by harvesting in areas already dissected by muskeg openings. This alternative was dropped due to its high impact on wildlife, particularly brown bear habitat and very poor harvest economics.

Seven other alternatives including an alternative to harvest no timber at this time were considered in detail in the Final EIS. The six harvest alternatives varied the volume harvested from 7 to 20.5 Million Board Feet and the acres harvested from 284 to 884 acres. The alternatives also varied in their approaches to road development and transfer of logs to saltwater. Their emphasis also varied between the three geographic areas (ie. between the West Face, Tom Creek and Frank Creek) and ecological zones being harvested (ie. between the Saltwater Influence Zone, Saltwater-facing Uplands and Interior Uplands). A comparison summary of all the alternatives is provided in the Summary and Chapter 2 of the Final EIS.

The Environmentally Preferred Alternative for this project is the "No-Action" alternative (Alternative A). Then again, one could also argue that Alternatives B, D and G are the environmentally preferred alternatives, depending on the Desired Future Condition of the Area. It is difficult for humans to describe what the natural system "would prefer" outside the context of how humans plan to use the area.

Mitigation

Mitigation includes measures prescribed and implemented to avoid, reduce, minimize or eliminate the adverse effects of actions. These measures were applied in the development of the project alternatives, including the selected alternative and in the design of the harvest units and road corridors. The Mitigation Measures section of Chapter 2 of the Final EIS discusses the mitigation measures common to all alternatives.

Mitigation measures applicable to the selected alternative include the standards and guidelines of the Tongass Land Management Plan of 1979 (as amended), Draft Tongass

Land Management plan Revision, Alaska Regional Guide and applicable Forest Service manuals and Handbooks. The Final EIS includes site-specific mitigation measures described in Chapter 2 and Harvest Unit Plans, Road and LTF Cards described in Appendix A. These measures are adopted as part of this decision and will be implemented unless consultation with agency specialists determines that site-specific circumstances have changed or are not present which warrant these measures. All practical means to avoid or minimize adverse environmental effects of the selected alternative have been adopted.

Monitoring

The Forest Service uses monitoring to evaluate whether the resource management objectives of the Final EIS have been implemented and whether the steps identified were effective in mitigating environmental effects. I am selecting the monitoring requirements specified in Appendix B of the Final EIS. For each of the five monitoring items listed, an objective, desired result, and method of measurement are identified. The Stikine Area Forest Supervisor is responsible for ensuring that project implementation, mitigation, monitoring, and enforcement are accomplished as specified.

Findings Required By Law

This decision is consistent with the **Alaska Regional Guide and the Tongass Land Management Plan of 1979** (as amended in 1985/85). The areas of undisturbed old-growth wildlife habitat maintained in this alternative exceed the standards for retention established in the Forest Plan. Although not required, the activities authorized in this decision are also consistent with the proposed standards and guidelines of the Supplement to the Draft EIS for the TLMP Revision.

Harvest units were designed and will be located to maintain a minimum 100-foot buffer zone for all Class I streams and Class II streams which flow directly into Class I streams as required in Section 103 of the **Tongass Timber Reform Act**. The actual widths of these buffers will often be greater than the 100 foot minimum. The design and implementation direction for the selected alternative incorporate Best Management practices for protection of all stream classes.

Actions authorized in the selected alternative are not anticipated to have direct, indirect, or cumulative effects on any threatened, endangered or sensitive species in the Campbell project area. A complete biological assessment is included in the planning record for this project. I have determined that this action will not have any adverse impacts on any threatened or endangered species and is consistent with the **Endangered Species Act**.

Management activities within 330 feet of an eagle nest site are restricted by a Memorandum of Understanding (MOU) between the Forest Service and the U.S. Fish and Wildlife Service to facilitate compliance with the **Bald Eagle Protection Act**.

The design of harvest units for the selected alternative was guided by standards, guidelines, and direction contained in the current TLMP, the TLMP Revision, Alaska Regional Guide, and applicable Forest Service manuals and handbooks. The unit cards (Appendix A) contain specific details on practices prescribed to prevent or reduce non-point sediment sources.

Implementation with site specific application and monitoring of approved BMPs in accordance with the Memorandum of Agreement between the Forest Service and the Alaska Department of Environmental Conservation is expected to comply with applicable **State Water Quality Standards and Regulations**.

The State Historical Preservation Officer has been consulted and we have received concurrence that the methods of survey and results comply with the **National Historic Preservation Act**. All ground disturbing activities associated with this action have received cultural resource clearance by the State Historic Preservation Officer. Based on surveys conducted in the project area, I have determined that there will be no significant effects on cultural resources.

A subsistence evaluation was conducted for the seven alternatives considered in detail in accordance with **ANILCA Section 810**. The full analysis is located in the planning file for this project and summarized in Chapter 4 of the Final EIS. The evaluation of scoping and additional analysis indicate that there is no significant possibility of a significant restriction for subsistence uses of wildlife, fish, shellfish, marine mammals, other foods and timber resources.

Executive Order 11988 directs federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of all floodplains. The selected alternative minimizes adverse impacts to floodplains because it contains no road development and applies Best Management Practices.

Executive Order 11990 requires federal agencies to avoid the long and short-term adverse impacts associated with the modification or destruction of wetlands. No wetlands will be altered by timber harvest.

I have determined that the proposed activities are consistent with the **Alaska Coastal Management Program** to the maximum extent practicable. In accordance with the Memorandum of Understanding and Alaska Statutes, the Office of Governmental Coordination will do a consistency review of the selected alternative and will concur with, or object to, this determination.

I have determined that this action will not adversely affect prime farm land, range land, rivers eligible for Wild and Scenic River designation, Class II Airshed standards associated with the Clean Air Act, or wilderness, nor will it adversely impact civil rights, women, or minorities.

The State and Federal permits necessary to implement the authorized activities are listed in Chapter 1 of the Final EIS.

Implementation

Implementation of this decision may occur no sooner than 30 days after the date of publication of the Notice of Availability of the Final EIS in the Federal Register. Implementation of all activities authorized by this Record of Decision will be monitored to ensure that they are carried out as planned and described in the Final EIS and ROD.

Appendix A of the Final EIS contains the unit and Log Transfer site plans. These are an integral part of this decision because they document specific resource concerns, objectives, and mitigation measures. The silvicultural prescriptions are also included in the FEIS at the beginning of Appendix A. The design and prescriptions for the

harvest units and the implementation measures for the Log Transfer Facility will be carried out. Minor modifications may result upon implementation with consultation of the appropriate specialists.

Right to Appeal

This decision is subject to administrative appeal. Organizations or members of the general public may appeal this decision according to Title 36 Code of Federal Regulations (CFR) Part 217. The appeal must be filed within 45 days of the date that legal notification of this decision is published in the Petersburg Pilot, the official newspaper of record. Two copies of the Notice of Appeal must be filed with:

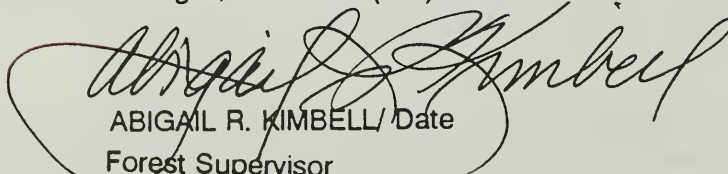
Michael A. Barton, Regional Forester
USDA Forest Service
P.O. Box 21628
Juneau, AK 99802

It is the responsibility of those who appeal a decision to provide the Regional Forester sufficient narrative evidence and argument to show why the decision by the Forest Supervisor should be changed or reversed. At a minimum, the written notice of appeal must:

1. State that the document is a Notice of Appeal filed pursuant to 36 CFR part 217;
2. List the name, address, and telephone number of appellant;
3. Identify the decision about which the requestor objects;
4. Identify the document in which the decision is contained by title and subject, date of the decision and name and title of the Deciding Officer;
5. Identify specifically that portion of the decision document to which the requestor objects;
6. State the reasons for the objection, including issues of fact, law, regulation, or policy and if applicable, specifically how the decision violates law, regulation or policy; and
7. identify the specific change(s) in the decision that the appellant seeks.

For additional information concerning the specific activities authorized with this decision contact the Campbell Planning Team at the following address:

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9/29/93

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Abstract: This Final Environment Impact Statement describes the effects of six "action" alternative approaches and one "no action" approach to harvesting timber in the Campbell Study Area. The action alternatives also involve the construction of one or more Log Transfer Facilities. Some of the alternatives also propose the construction of road. Mitigation measures and monitoring items are also proposed.

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Summary

Summary

Introduction

This Environmental Impact Statement (EIS) has been prepared by the Stikine Area of the Tongass National Forest. In it we describe six alternatives for timber harvest and the development of a transportation system in the Campbell project area. A "no action" alternative is also described as well as the expected outputs and environmental effects of all seven alternatives.

Project Area Location

The Campbell Timber Sale Study Area is located in Southeast Alaska on the north shore of the Bradfield Canal southeast of the town of Wrangell, Alaska. The study area includes the entire Value Comparison Unit (VCU) 510 but the actual area being considered for timber harvest includes approximately the southern 1/3 of the VCU (See FEIS Chapter 1, Figure 1-1).

Purpose and Need For The Project

The purpose of this project is to consider specific alternatives to harvest timber within the project area given the guidance in the Tongass Land Management Plan which presently directs us to manage the area for timber production. The need for harvesting timber and managing future timber production is to provide wood products and the opportunity for timber related jobs. According to the Forest Plan, the project area presently contains areas that can support the production of timber over time while still meeting scenic quality objectives, wildlife and fishery habitat needs.

Proposed Action

The proposed action for the Campbell Timber Sale is to remove approximately 8 Million Board Feet of timber from the project area with a helicopter. To accomplish this, a road system, sort yard, logging camp and one or more Log Transfer Facilities (LTF's) will likely be needed in the project area. In this document, other alternatives which meet the purpose and need are also considered as well as the "no action" alternative.

1 Summary

Decision Needed

The Stikine Area Forest Supervisor, will decide; a) whether to harvest timber from the project study area; b) how much volume to make available to contractors; c) the location and design of harvest units, Log Transfer Facilities (LTF's), roads and a logging camp; and d) the mitigation measures or any enhancement opportunities for resources in the project area.

Management Direction

The management direction for the project area is established by the Tongass Land Management Plan. Presently VCU 510 is allocated to a "LUD IV" for the intensive development of natural resources with a primary emphasis on commodity or market values. The Tongass Land Management Plan is presently being revised. The new Forest Plan will give new management direction to the project area.

Ecosystem Approach

An ecosystem approach was used in the planning of this project through the designation of six ecological zones. Much of the analysis was conducted using these zones and describing the potential effects of the proposed activities on the zones. There are six groups of ecological systems within the study area. From lowest to highest elevations, they include the *marine* zone, the *saltwater influence* zone, the *freshwater influence* zone, the two upland zones: the *interior uplands* and *saltwater-facing uplands* and lastly, the *alpine/brushy slope* zone (See FEIS, Chapter 1, Figure 1-2). Each zone has a different set of interactions between soil, water, vegetation, animals, fish and people.

Key Planning Issues

Although there are often many issues associated with the planning of a timber sale, the National Environmental Policy Act directs us to analyze in detail only those issues which are significant. This ensures that the bulk of the analysis effort and the document remains focused on the issues which are most important to the project. We identified ten issues through the public participation process which form the basis for the alternatives:

Issue One

The effects of the transportation system and harvest proposals on the productivity and function of the freshwater system.

Issue Two

The effects of the transportation system on the productivity and function of beach areas.

Issue Three

The effects of different methods and locations of log entry on marine fish and shellfish productivity.

Issue Four	The effects of harvest proposals on species conservation.
Issue Five	The impacts of harvest proposals on goat winter range, disturbance of kidding and rearing areas and travel corridors.
Issue Six	The impacts of harvest and roads on brown bear habitat and harvest both during and after logging.
Issue Seven	The effects of harvest proposals on soil productivity.
Issue Eight	The effects of the proposal on cultural resources and other social values in and around the study area.
Issue Nine	The effects of a logging camp on recreation use, fish and wildlife.
Issue Ten	The economic costs and revenues of the proposals with expensive aerial logging systems being used.

Alternatives

When we develop a range of alternatives to the proposed action, two primary factors are important; the "purpose and need" for the project must be satisfied and the issues developed through public participation must be addressed. Public comments and suggestions were important to us.

Overstory removal harvest removes the larger diameter trees or overstory, leaving the smaller diameter trees in the harvest unit. On the proposed Campbell Timber Sale, trees 12" or 16" in diameter or less would be left standing after harvest. Trees with a diameter greater than 12" or 16" would be harvested. Some of the units would also contain scattered, larger diameter "leave trees" to add even greater diversity to the remaining stand of trees.

Group selection (harvest less than 2 acres in size) and patch cutting (harvest 2-10 acres in size) were sometimes our selected harvest method to respond to a specific issue (such as goat habitat or fragmentation) or ways of harvesting timber off forested areas that were patchy or broken by cliffs.

Alternative A

The "No Action" Alternative

This alternative discloses the effects of not harvesting in the project area at this time and is required by NEPA. It assumes no change in the current management and would propose no further development at this time. This alternative also serves as a basis of comparison for the "action" alternatives. This alternative would provide for the continuation of existing recreation uses of the area which are dependent on a natural appearing, scenic landscape and semi-primitive or primitive experiences. Outfitting and guiding operations would only be limited by other circumstances such as competition with each other or regulations. The project area would continue to be predominated by relatively unfragmented, old growth vegetation which would benefit several species, particularly goats, goshawks, marten and murrelets. There would be no temporary disturbance of brown bear, goat or fish habitat. Intertidal areas would remain undisturbed. The economic advantage of this alternative could be to leave the area as it is until harvest economics or technologies improved.

Alternative B

Would harvest in Frank Creek and reserve areas along the West Face and Tom Creek.

This alternative represents the "proposed action" outlined in Chapter 1. We designed this alternative to harvest timber in the area with the least amount of change to the existing "human habitats" of the west face and Tom Creek. This alternative minimizes fragmentation of the corridor between the study area and the Marten Creek watershed which also minimizes the effects on high quality goat habitat. Under this alternative we favored retaining old growth areas along the West Face to complement this objective (some retained areas could instead be concentrated in Tom Creek to allow a future entry along the West Face). There is only one watershed affected by this alternative which reduces the risk to the freshwater zone and the species of fish and wildlife that rely on it. A single harvest entry is expected in Frank Creek since we propose to harvest most of the suitable areas. The road would therefore be closed and the LTF rehabilitated. The harvest operation is concentrated within a small area which helps reduce logging costs.

Alternative D

Would harvest the West Face and retain the interior uplands.

We designed this alternative to eliminate the need for roading and have all harvested timber flown by helicopter to a landing, barge or water drop. Areas set aside to retain old growth habitats were located in the interior uplands of Frank and Tom Creek (Figure 2-2 shows the retained areas in Frank Creek but another option could favor retaining some areas in Tom Creek as shown for Alternatives F and G). Risk to the marine and freshwater systems of Frank and Tom Creek are minimized but there would be effects to goat habitat and noticeable changes to the viewshed of the Bradfield Canal because most of the harvest occurs in the saltwater-facing zone. A single harvest entry is expected on the west face since most of the suitable lands are harvested in this zone. The lack of roading and one LTF increases the economic efficiency and reduces the effects on brown bear. The LTF would be rehabilitated. Potential future harvest entries could occur in Frank or Tom Creek depending on alternative strategies of retaining old growth areas over time.

Alternative E

Would harvest the West Face, Frank and Tom Creeks and disperse retained areas.

This alternative disperses harvest and retention throughout the project area. This alternative also represents our view of the maximum area capable of being harvested within the project area under Forest Plan direction, present technology and market conditions. This alternative would fragment old growth blocks within the project area. We would therefore rely on blocks of old growth habitat in the Harding and Marten Creek watersheds to supply the needs for these conditions in the north Bradfield landscape. This alternative would have the most effect on the freshwater and upland zones and therefore a greater effect on wildlife and fish habitat. Because the transportation system required is so extensive, development costs are high and the impacts to the saltwater and marine zones are greatest. Roads would be closed and rehabilitated. This alternative would implement the greatest degree of change to the established pattern of use by people, increase access and benefit those looking for a roaded, hike-in recreation experience. Increased access would affect wildlife populations, particularly brown bears. A single harvest entry would be expected over the entire project area.

Alternative F

Would harvest the West Face and Frank Creek and retain Tom Creek.

The objective of this alternative is to make a single entry into the project area and concentrate retained old growth acres within the Tom Creek watershed. This alternative would fragment existing blocks of old growth within the project area. We would rely on blocks within the Harding and Marten Creek watersheds to supply this habitat in the north Bradfield landscape. This alternative would predominantly affect the west face and the freshwater and upland zones of Frank Creek. There would be a noticeable change in the landscape as viewed from the Bradfield Canal. The road would be closed and LTF rehabilitated. The established pattern of use would remain unchanged in the Tom Creek watershed while roaded, hike-in recreation opportunities would be enhanced in Frank Creek. Since access is not increased in the Tom Creek drainage important brown bear habitat is retained.

Alternative G

Would harvest the West Face (w/ Group Selection) and Frank Creek and retain Tom Creek.

The objective of this alternative is to make a single entry within Frank Creek but regenerate the West Face over time using group selection and retain old growth acres within the Tom Creek watershed. Three harvest entries would be expected on the West Face over time using group selection to remove 1/3 of the timber on suitable lands each time. This alternative would have similar effects as Alternative F except the group selection harvest method would reduce fragmentation of the West Face and effects to key goat habitat during this entry. There would also be little noticeable change in the landscape as viewed from the Bradfield Canal. The road up Frank Creek would be closed and the LTFs rehabilitated.

Alternative P

Was based on public comment on the DEIS.

This alternative was formulated from public and other agency comments on the Draft EIS by striking a compromise combining the best features of Alternative D and Alternative F by eliminating road construction, reducing the harvest of high value, goat winter range, and only developing one LTF. This alternative would fragment existing blocks of old growth within the project area. We would rely on blocks within the Harding and Marten Creek watersheds to supply this habitat in the north Bradfield landscape. Since access is not increased in the Tom or Frank Creek watershed, important brown bear habitat is retained. Harvested timber would be flown by helicopter to either an LTF, barge or dropped in the water. Areas set aside to retain old growth habitats were located in the interior uplands and the West Face. There will be noticeable changes to the viewshed of the Bradfield Canal because most of the harvest occurs in the saltwater-facing zone. A single harvest entry is expected. Potential future harvest entry could occur in Tom Creek.

Table A, Alternative Characteristics

Character	Alt.A	Alt.B	Alt.D	Alt.E	Alt.F	Alt.G	Alt.P
Acres Harvested	0	284	434	884	565	396	476
Old Growth Acres Retained & Emphasis	N/A	960, West Face & Tom Creek	960, Interior Uplands	960, Dispersed	960, Tom Creek	960, Tom Creek	960, West Face & Tom Creek
Harvest Volume (MMBF)	0	7.0	10.5	20.5	14.0	9.7	11.6
Miles of Road	0	1.3	0	4.6	1.3	1.3	0
LTF Sites	0	1, Frank Creek	1, West Face	3, All	2, Frank Creek and West Face	2, Frank Creek and West Face	1, West Face

Table B, Activity In Zones

Zone	Alt.A	Alt.B	Alt.D	Alt.E	Alt.F	Alt.G	Alt.P
Marine	None	1 LTF	1 LTF, Barge & Water Drops	3 LTF, Barge & Water Drops	2 LTF, Barge & Water Drops	2 LTF, Barge & Water Drops	1 LTF, Barge & Water Drops
Saltwater Influence	None	1 LTF,.3 Miles Road	1 LTF	3 LTF,.7 Miles Road	2 LTF,.3 Miles Road	2 LTF,.3 Miles Road	1 LTF
Fresh Water Influence	None	28 Acres Harvest, 1 Mile Road	66 Acres Harvest	166 Acres Harvest 3 Miles Road	74 Acres Harvest 1 Mile Road	52 Acres Harvest 1 Mile Road	52 Acres Harvest

Table B, Activity In Zones (continued)

Zone	Alt.A	Alt.B	Alt.D	Alt.E	Alt.F	Alt.G	Alt.P
Upland Saltwater Facing	None	141 Acres Harvest	353 Acres Harvest	502 Acres Harvest .7 Miles Road	376 Acres Harvest	229 Acres Harvest	359 Acres Harvest
Interior Upland	None	115 Acres Harvest	14 Acres Harvest	216 Acres Harvest .2 Mile Road	115 Acres Harvest	115 Acres Harvest	65 Acres Harvest

Table C, Alternative-Issue Comparison Chart

Alternative	Issue One- Freshwater Areas	Issue Two- Beach Areas	Issue Three- Marine Areas
Alternative A	No effect on existing riparian, freshwater aquatic or wetland conditions.	No impacts to beach areas.	No impacts to marine areas.
Alternative B	Harvests 28 acres riparian habitat; impacts wildlife corridor values in Frank Creek; Harvests along 1.3 miles of stream; Builds 1.3 miles of road in Frank Creek watershed; 2 stream crossings; Harvests 5% of Frank Creek watershed; enables increased fishing access to Frank Creek; six acres forested wetlands harvested; 2.6 acres of wetland impacted by road.	Construction and operation of 1 LTF near Frank Creek estuary; estimated duration of activity 1 year.	Uses only Frank Creek LTF which meets only six of twelve ATTF guidelines; 7.0 MMBF would be watered.
Alternative D	Harvests 66 acres of riparian habitat mostly along Class III streams; least effect on riparian corridors other than Alt. A; Harvests along 2.2 miles of stream; no road or stream crossings; Harvests 1% of Frank and <1% Tom Creek watersheds; least risk to fish other than Alt. A; no increased access to Tom or Frank Creek; no wetlands impacted.	Construction and operation of 1 LTF on west face; estimated duration of activity 1 year; least effect overall except Alt A.	Uses West Face LTF which meets most of twelve ATTF guidelines; 10.5 MMBF would be watered and dewatered at this site.
Alternative E	Most riparian acres harvested (166); Most effect on riparian corridors especially Tom Creek area; Harvests along 4.4 miles of stream; 4.6 miles of road with 6 stream crossings; Harvests 5% of Frank, and 1% Tom Creek watershed; most risk to fish; increased fishing access to Tom and Frank Creeks; 33 acres forested wetlands harvested; 8.7 acres of wetland impacted by roads.	Construct and operate 3 LTFs; duration of activity 2 years; most impact overall to beach areas.	Uses all three LTF's to water and dewater 20.5 MMBF. 6.0 MMBF watered at Tom Creek LTF site which meets most of ATTF siting guidelines. Other LTF's water/dewater same as under Alt. F.
Alternative F	Harvests 74 acres of riparian habitat; impacts riparian corridor values in Frank Creek; Harvests along 2.9 miles of stream; 1.3 miles of road in Frank Creek watershed with 2 stream crossings; Harvests 5% of Frank watershed; second greatest risk to fish; enables increased fishing access to Frank Creek; six acres forested wetland harvested; 2.6 acres of wetlands impacted by roads.	Construct and operate 2 LTFs; duration of activity 1-2 years; second greatest impact on beach areas.	Uses Frank and West Face LTF's to water 7.0 MMBF at Frank Creek and water/dewater 7.0 MMBF at West Face.

Table C, Alternative-Issue Comparison Chart (continued)

Alternative	Issue One- Freshwater Areas	Issue Two- Beach Areas	Issue Three- Marine Areas
Alternative G	Harvests 52 acres of riparian habitat; impacts riparian corridors in Frank Creek; areas harvested lie along 3.2 miles of stream but west face units are group selection; 1.3 miles of road in Frank Creek watershed with 2 stream crossings; Harvests 5% of Frank watershed; enables increased fishing access to Frank Creek; 26 acres of wetland harvested; 2.6 acres of wetlands impacted by roads.	Construct and operate 2 LTF's; duration of activity 1-2 years.	Uses Frank and West Face LTF's to water 7.0 at Frank Creek and water/dewater 3 MMBF at West Face.
Alternative P	Harvests 52 acres of riparian habitat; impacts riparian corridors in Frank Creek; harvests along 2.6 miles of stream; no roads or stream crossings; harvests 3% of Frank Creek; low risk to fish; no impact to wetlands; no greater human access provided.	Construct and operate 1 LTF for 1-2 years. Second least amount of impact of action alts.	Uses West Face LTF to water and dewater 11.6 MMBF. West Face meets most ATTf guidelines.

Table C, Alternative-Issue Comparison Chart

Alternative	Issue Four-Species Conservation	Issue Five-Goats	Issue Six- Brown Bears
Alternative A	No effects on species conservation variables.	No effect on present amount and quality of goat habitat and movements.	No effects on present amount of habitat or potential for harvest.
Alternative B	Least effect of action Alts to indicator species; fragments old growth blocks and corridors the least; increases access into Frank Creek.	Least effects on habitat values of action Alts; retains 98% of habitat capability; little effect on vertical corridors; harvests 1% of VCU high value habitat.	Retains 98% of original habitat capability with intermediate effects on access due to increased access up Frank Creek.
Alternative D	Intermediate effects to indicator species; intermediate effects to old growth blocks; fragments west face corridor but does not increase human access over time.	Retains 95% of habitat capability; some barriers to vertical migration; Harvests 12% of VCU high value habitat.	Retains 99% of original habitat capability with no long-term effects on access.
Alternative E	Greatest effects to indicator species; maximum fragmentation of old growth; maximum human access.	Retains 93% of habitat capability; some barriers to vertical migration; Harvests 13% of VCU high value habitat.	Retains least (96%) of habitat capability; much greater impact from increased access due to road up Tom Creek.
Alternative F	Second greatest effects to indicator species; second ranking in maximizing fragmentation; increased access up Frank Creek.	Retains 94% of habitat capability; some barriers to vertical migration; Harvests 13% of VCU high value habitat.	Retains 97% of habitat capability; increased access up Frank Creek.
Alternative G	Third greatest effects on indicator species; similar effects to fragmentation as B but slightly greater; increased access up Frank Creek.	Retains 94% of habitat capability; few barriers to vertical migration; Harvests 5% of VCU high value habitat.	Retains 98% of habitat capability; increased access up Frank Creek.
Alternative P	Intermediate effects to indicator species; Intermediate effect to old growth blocks; fragments west face corridor but does not increase human access.	Retains 95% of habitat capability; retains large block of high value habitat on west face; fewer barriers to vertical migration; Harvests 9% of VCU high value habitat.	Retains 98% of habitat capability with no long term effects on access.

Table C, Alternative-Issue Comparison Chart

Alternative	Issue Seven- Soil Productivity	Issue Eight-Social Values	Issue Nine- Logging Camp	Issue Ten- Economics
Alternative A	No effect on soil productivity	No effects on present values; natural appearing landscapes; no impact on outfitting and guiding from harvest; primitive & semi-primitive experiences provided.	No camp.	Outfitting and guiding values may benefit. Harvest postponed until economics or technology improves.
Alternative B	Low risk of disturbance to soil; some lands out of production; 11 acres harvest on high hazard soil.	Least change in existing areas among action plans; increased recreation access up Frank Creek; Retains existing recreation values up Tom's; no effects on cultural resources or subsistence; least visual effects and risk; harvest not noticeable; most outfitting and guide potential maintained.	Duration and extent of recreation displacement is least of all action plans; Tom Creek recreation should be unaffected; some opportunity for harvest of fish and wildlife up Frank Creek watershed; duration most limited.	Below cost at mid-market levels.
Alternative D	Low risk of disturbing soil; fewest lands out of production of all action plans; 52 acres harvest on high hazard soil.	Least change in present access pattern; most potential changes occur to Bradford Canal; retains existing recreation values up Tom's; 68 acres in high probability cultural area; harvest should not be noticeable but high risk to visual resource.	Duration and extent of recreation displacement is slightly more than Alternative B. Least amount of opportunity for harvest of fish and wildlife; duration is slightly more than B.	Greatest positive return.

Table C, Alternative-Issue Comparison Chart (continued)

Alternative	Issue Seven- Soil Productivity	Issue Eight-Social Values	Issue Nine- Logging Camp	Issue Ten- Economics
Alternative E	Some risk of disturbance due to cable logging; most lands out of production; 89 acres harvest on high hazard soil; some road segments in high hazard terrain.	Most change in access and in views up Bradfield and Tom; increased access; no effects to cultural resources or subsistence; harvest should not be noticeable from Bradfield but high risk. Outfitters may loose up to half their potential use under worst-case scenario.	Duration and extent of recreation displacement is greatest; most opportunity for harvest of fish and wildlife and greatest risk to bear, and fish populations; duration is the greatest.	Most negative return below cost at mid-market levels.
Alternative F	Low risk to soil disturbance; some lands out of production; 75 acres harvest on high hazard soil.	Changes to Bradfield and Frank Creek landscape; increased recreation access up Frank Creek; retains existing recreation values in Tom's; no affect to cultural or subsistence resources; combines visual effects of Alts B and D.	Duration and extent of recreation displacement is intermediate; recreation up Tom Creek should be unaffected; opportunity to harvest fish and wildlife up Frank Creek; duration is greater than Alt. B & D but less than Alt. E.	Positive economic return.
Alternative G	Low risk to soil disturbance but some risk of blowdown; some lands out of production; 46 acres harvest on high hazard soil.	Changes to Bradfield will not be noticed; retains existing recreation values up Tom's; no effect on cultural or subsistence resources; visual effects similar to Alt. B; retains most of values for outfitter and guides.	Similar effects to recreation, fish and wildlife as Alternative F.	Second most negative return below cost at mid-market levels.
Alternative P	Low risk of disturbing soil; fewest acres out of production; 81 acres harvest on high hazard soil.	Changes to Bradfield and Frank Creek landscape; human access pattern remains the same; retains existing recreation and outfitting values in Tom's; no cultural or subsistence resources affected; visual affects are less than F and D.	Similar impacts to Alternative D. Displacement for 1-2 seasons.	Positive economic return.

Chapter 1

Purpose of and Need for Action

Chapter 1

Purpose of and Need for Action

Introduction

This Environmental Impact Statement (EIS) has been prepared by the Stikine Area of the Tongass National Forest. In it we describe six alternatives for timber harvest and the development of a transportation system in the Campbell project area. A "no action" alternative is also described as well as the expected outputs and environmental effects of all seven alternatives. This document is organized into four chapters:

Chapter 1, Purpose and Need describes the purpose, background information and key planning issues for the project.

Chapter 2, Alternatives describes the various alternatives and summarizes the consequences of each alternative on the key planning issues.

Chapter 3, Affected Environment describes the existing situation and the ecology of the project area.

Chapter 4, Environmental Consequences predicts the effects of implementing each alternative on the key planning issues and ecological systems.

Background

As managers of the Tongass National Forest, we are guided by several laws including the Multiple Use Sustained Yield Act of 1960. This law requires us to manage for a sustained supply of water, recreation, fish, wildlife and forest products. More specific management direction is provided by the Tongass Land Management Plan, or TLMP, which further defines the locations and conditions of uses on the Forest. Each project planned on the Forest then undergoes a specific planning process guided by the National Environmental Policy Act (NEPA). This process leads to the document you are now reading which discloses the effects of implementing the project.

In 1983, we analyzed the Campbell project area for timber harvest and produced a Environmental Assessment (EA) and a decision to clearcut approximately 14 million board feet of timber on 675 acres. In 1983, impacts on the environment were expected to be insignificant. For this sale planning effort, following new policies and guidelines, we must conduct a higher level of analysis and produce an Environmental Impact Statement (EIS), because of the size of the roadless area potentially impacted by the project and the potential for significant effects on the environment. This early analysis is part of the planning file for this sale.

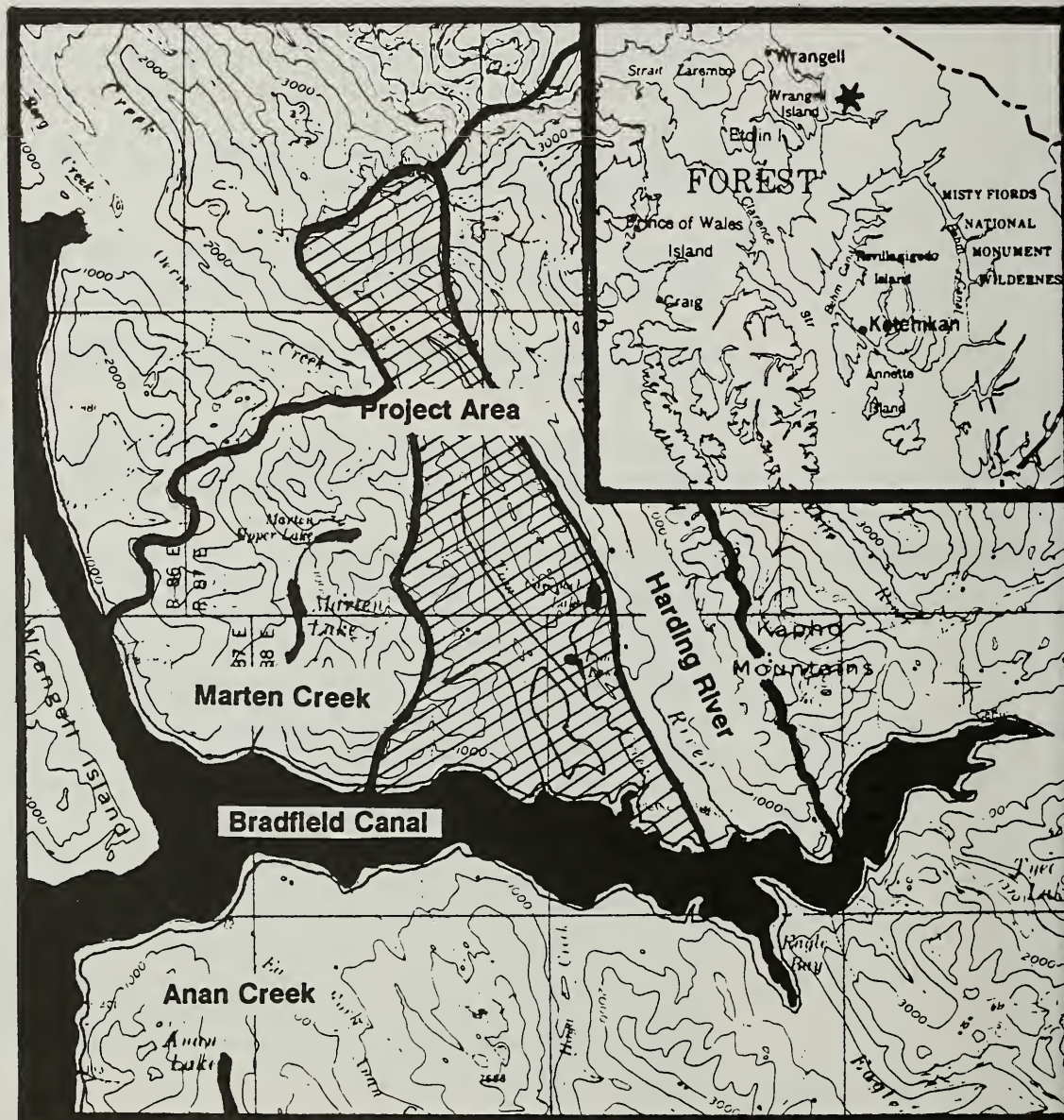
The first sale planned in the project area in 1983, was offered to the timber market but was never sold. This 1993 sale planning effort is being conducted with the intent of offering a sale to the independent market.

1 Purpose and Need

Project Area Location

The Campbell Timber Sale Study Area is located in Southeast Alaska on the north shore of the Bradfield Canal southeast of the town of Wrangell, Alaska. The study area includes the entire Value Comparison Unit (VCU) 510 but the actual area being considered for timber harvest includes approximately the southern 1/3 of the VCU (See Figure 1-1).

Figure 1-1 Project Area Map



Purpose and Need For The Project

The purpose of this project is to consider specific alternatives to harvest timber within the project area given the guidance in the Tongass Land Management Plan which presently directs us to manage the area for timber production. The need for harvesting timber and managing future timber production is to provide wood products and the opportunity for timber related jobs. According to the Forest Plan, the project area presently contains areas that can support the production of timber over time while still meeting scenic quality objectives, wildlife and fishery habitat needs.

Proposed Action

At the start of the planning process we defined a "proposed action." This serves as a starting point for the planning process and lets the public and other agencies know more about the project we are considering so you can comment. The "proposed action" is not necessarily our "preferred alternative." The proposed action is simply a starting point.

The proposed action for the Campbell Timber Sale is to remove approximately 8 Million Board Feet of timber from the project area with a helicopter. To accomplish this, a road system, sort yard, logging camp and one or more Log Transfer Facilities (LTF's) will likely be needed in the project area. In this document, other alternatives which meet the purpose and need are also considered as well as the "no action" alternative.

Decision To Be Made

The Stikine Area Forest Supervisor, will decide; a) whether to harvest timber from the project study area; b) how much volume to make available to contractors; c) the location and design of harvest units, Log Transfer Facilities (LTF's), roads and a logging camp; and d) the mitigation measures or any enhancement opportunities for resources in the project area.

Forest Service Planning Method

When timber sale project planning begins, we designate a group of professionals with a variety of educational backgrounds to a team known as an "Inter-disciplinary Team" or "IDT." This team conducts the planning process, writes this document and informs you and the decision-maker of the alternatives and the environmental consequences. Another responsibility of this team is to work with the public and the various State and Federal agencies to plan the best project possible.

Ecosystem Management

Ecosystem management is both a process and a product. The process of ecosystem management encourages us to understand the interrelationships between people and the often intricate web of natural processes which are occurring in and around the forest. The more we understand these relationships the better we are able to use the products of the land without affecting the capacity of the system to produce future products. The ecosystem management concept is also broad enough to include man's stewardship of the land for reasons that do not directly benefit people.

The Campbell planning team has tried to incorporate the concepts of ecosystem management into this project by examining the project area within the context of the surrounding landscape. We have tried to describe the systems and ecology of the area not just the resources. Also, we have examined this action within the context of possible future actions and conditions (see "Desired Future Condition" section). If you have read several Environmental Impact Statements before, you may find that this one is structured differently as a result of the approach we used to conduct the analysis.

Your Role in Planning This Project

Because people are an important part of ecosystem management, people must be involved in the project planning process. We began the public notification process by publishing a Notice of Intent in the Federal Register on April 21, 1992. We also mailed over 300 individuals and agencies on the Stikine Area mailing list a letter describing the proposed action, project location and tentative issues. Twenty-five persons responded to this initial announcement of the project and were helpful in refining the key planning issues. In August, we conducted a four day "open house" so the general public could discuss the issues and preliminary alternatives with us more informally.

Other Agency Involvement in Planning This Project

In July and August, we conducted two field trips to the study area with representatives from the Alaska Department of Fish and Game, Fish and Wildlife Service and Alaska Department of Environmental Conservation. The purpose of these trips was to discuss the planning issues and preliminary alternatives. In addition, if an action alternative is selected, the Forest Service is responsible coordinating the following reviews:

US Army Corp of Engineers- Approval to dredge or fill materials into the coastal waters of the United States under Section 404 of the Clean Water Act.

Environmental Protection Agency- National Pollution Discharge Elimination System Review under Section 402 of the Clean Water Act.

State of Alaska, Department of Natural Resources- Tideland Permit and lease or easement.

State of Alaska, Department of Environmental Conservation- Solid Waste Disposal Permit and Certificate of compliance with Alaska Water Quality Standards under Section 401 of the Clean Water Act.

State of Alaska, Coastal Zone Consistency- The Alaska Coastal Management Program (ACMP) developed under the Coastal Zone Management Act requires federal agencies to design their activities to be compatible with approved State management guidelines to the maximum extent practicable.

State of Alaska, State Historic Preservation Officer- Compliance with Section 106 of the National Historic Preservation Act, a process to determine the potential effects of "action" alternatives on cultural resources.

Overall Management Direction For the Project

The Forest Plan

The management direction for the project area is established by the Tongass Land Management Plan. Presently VCU 510 is allocated to a "LUD IV" for the intensive development of natural resources with a primary emphasis on commodity or market values.

The Tongass Land Management Plan is presently being revised. The new Forest Plan will give new management direction to the project area. At present, the Supplement to the Draft EIS for the Tongass Land Management Revision has alternatives which allocate the project area to a wide spectrum of possible land uses including Primitive, Semi-Primitive, Scenic Viewshed, Modified Landscape and Timber Production. Therefore, under this project analysis we decided to provide a range of alternatives which would not foreclose on implementing the Revision Alternatives in case a decision on the new Forest Plan was made during our analysis. We also used some of the standards and guides from the Revision when they were compatible with the present Forest Plan.

Desired Future Condition

The "desired future condition" is based on the guidance in the Tongass Forest Plan and helps describe what conditions we would like to have in the project area in the future...not just for this project but others that may follow. We describe the desired future condition for VCU 510 in terms of desired conditions for six ecological zones.

The overall desired condition for the Campbell project area is a long-term, beneficial interaction between people, their needs and the environment. Ecological systems are sustained and manipulated in order to provide for long-term human needs. These needs include timber, the traditional harvest of fish and wildlife, quality recreation and a better understanding of our past. No more than two to three timber harvest entries are foreseen within an extended rotation of 120-150 years.

There are six groups of ecological systems within the study area which we called "zones." From lowest to highest elevations, they include the *marine* zone, the *saltwater influence* zone, the *freshwater influence* zone, the two upland zones: the *interior uplands* and *saltwater-facing uplands* and lastly, the *alpine/brushy slope* zone (see Figure 1-2). Each zone has a different set of interactions between soil, water, vegetation, animals, fish and people. Therefore, each zone has different ways of meeting the long-term needs of people and different desired conditions over time. Below we describe the desired condition that all the alternatives for harvest move us toward. There are three zones that support timber harvest; the Freshwater Influence, Saltwater Uplands and Interior Uplands. In the descriptions below we describe the percentage of these three zones that may ultimately be harvested over time (the "rotation") and convert old growth into younger forest. These percentages were calculated by taking the number of suitable and accessible lands in each zone (See Chapter 3, Table 3-8) and dividing by the total acreage in the zone. In the uplands, we subtracted the upland acres that we allocated to the management of old growth habitats.

Marine Zone Desired Conditions







Definition- In the Marine Zone lie areas below mean higher, high tide and includes estuaries. This zone is managed in cooperation with the State of Alaska and other Federal agencies.

1 Purpose and Need

Description- The desired condition is to maintain high quality marine and estuary habitats for a variety of life. Facilities will be located away from areas which provide important habitats for marine life. Impacts to the estuaries and intertidal areas will be minimized. Important cultural resources are located within this zone and will be studied and protected from development activities. Commercial, sport and subsistence fishing will continue to be an important need met in this zone. An increase in land management activities coupled with increased recreation visitation will result in higher traffic levels within the Bradfield Canal and the marine zone.

FIG. 1-2, ECOLOGICAL ZONES

Legend

-  Marine Zone
-  Saltwater Influence Zone
-  Freshwater Influence Zone
-  Saltwater Facing Uplands
-  Interior Uplands
-  Alpine and Brushy Slopes



Map scale 1:100000

1 0 1 2 Miles

Scale is 1 inch = 1.58 miles

Saltwater Influence Zone Desired Conditions

Definition- The Saltwater Influence Zone consist of areas affected by saltwater and maritime influences from mean higher, high tide to 500 feet slope distance or 1000 feet slope distance from estuaries. This is the smallest zone. There are 857 acres representing 3% of the study area within the Saltwater Influence Zone.

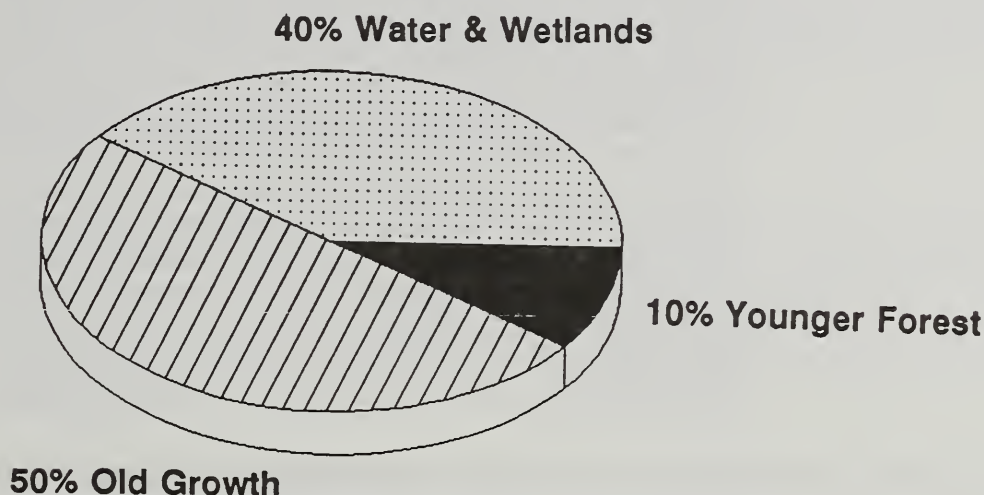
Description- The desired condition of this zone is to provide high-quality beach habitats for wildlife, including shorebirds, waterfowl, bald eagles and big game. The perpetuation of old growth stands of trees is the desired vegetative condition upland of the high tide line. Grasses, sedges and other vegetation on tidal flats will be maintained as forage for a variety of wildlife. Transportation facilities can be built in this zone but will be located away from the mouths of anadromous fish streams, minimize clearing of trees or tidal vegetation to minimal practicable widths and be located in areas having lesser value for marine life and vegetation. Coastal recreation will emphasize natural settings and minimize changes to existing opportunities. Facilities may be noticed by visitors but will be low profile and blend into the natural landscape. A high concentration of historic and cultural resources is located within this zone. These resources will be inventoried and protected and may be interpreted.

Freshwater Influence Zone Desired Conditions

Definition- In the Freshwater Influence Zone lie areas which affect or are affected by fresh water year around. The largest parts of this zone include Tom, Frank and Campbell Creeks and their associated lakes, wetlands and tributaries. Although influenced by rainfall, small upmappable channels and hillslope runoff are not included in this zone. This zone is very important for fish and wildlife habitat and travel. This zone connects all the other zones to each other and is also most influenced by other zones. Historically, the streams and open wetlands of Tom and Frank Creek have made travel into the densely vegetated landscape easier for both people and wildlife. In more modern times, these areas are key to boat and foot access for recreation, hunting and fishing. This zone is the second largest in size with 6,382 acres representing 23% of the study area.

Description- The desired condition of this zone is to maintain or improve the health and condition of freshwater aquatic, riparian and wetland ecosystems. High-quality habitat will be protected for fish and riparian-associated wildlife species. Vegetation types will continue to vary widely primarily due to a natural range of soil drainage conditions. Forested areas represent approximately 60% of this zone. The remaining 40% of this zone is composed of muskegs, other wetlands and water bodies. Eighty percent (80%) of the forested areas (or 50% of the zone) will be in an old growth condition while up to 20% of the forested area (or 10% of the zone) will be in younger age classes in order to provide vegetative diversity, forage for wildlife and timber (see Figure 1-3). Roughly half of these acres (or 5% of the zone) are presently economically marginal and may never result in harvest. These younger forested areas will be dispersed and located in the southern third of the VCU. A variety of trees (size and vigor) will be left in younger stands to provide structural diversity nesting habitat, brown bear bedding areas and channel/soil stability over time. Multi-storied and multi-aged stands will dominate in areas managed for timber. This zone will continue to provide key areas for travel by wildlife between zones and the adjacent watersheds of Marten Creek and the Harding River.

Figure 1-3, Desired Vegetative Composition of the Freshwater Influence Zone



Fish habitat protection or improvement will be emphasized by maintaining stream bank stability, water quality, large wood, pools and stream beds for resident and anadromous fish. Management will minimize disturbance of the unique and sensitive ravines underlain with fine-textured deposits along Frank and Tom Creeks. If roads are needed to benefit future management opportunities, they will most likely be located within this zone. Roads will be designed to best maintain soil and water systems, wildlife habitat/travel and reduce construction costs. Protection measures will be considered to reduce motorized traffic effects on wildlife and minimize changes to current recreation settings and experiences along Tom and Frank Creeks.

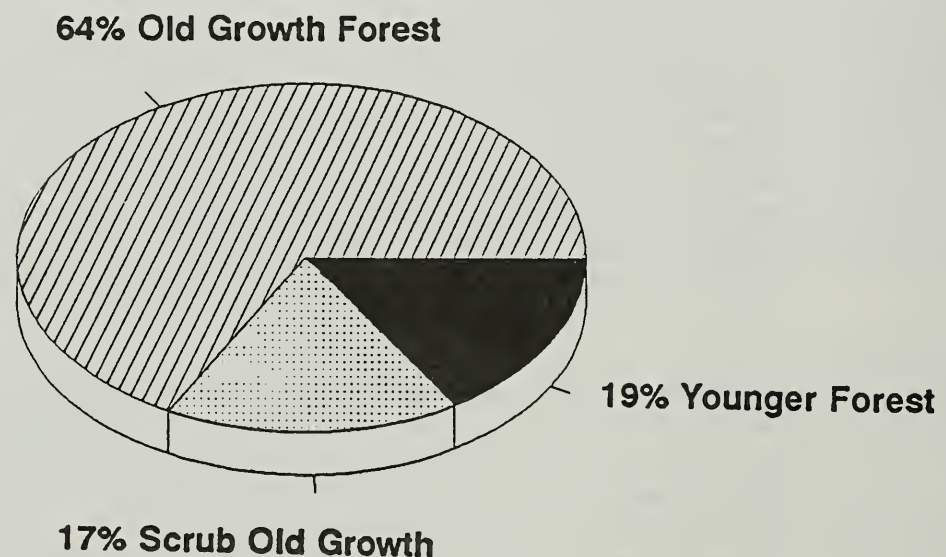
Existing and traditional foot or boat access for recreation, hunting and fishing will remain the same or improve. Boat travelers on Tom and Frank Creeks will notice few changes in the natural setting but foot travelers in the muskegs and wetlands along these streams will notice timber harvest areas in uplands surrounding this zone. Upland harvest may dominate some views in the wetland travel corridors of Tom Creek and most of the corridor of Frank Creek. Due to the importance of this zone for travel and access, opportunities to learn about and interpret cultural, ecological and applied management practices will be pursued.

Saltwater-facing and Interior Uplands Desired Conditions

Definition- The saltwater-facing uplands include uplands which generally drain directly into saltwater and face the Bradfield Canal. This is the second smallest zone with 3,254 acres representing 11% of the project area but containing 50% of the lands which are suitable and accessible for timber production. Interior uplands face into Frank, Tom or Campbell Creeks and drain into their associated tributaries, wetlands and lakes. These uplands contain 6,082 acres representing 21% of the study area, Although these uplands are larger in size than the saltwater uplands, they only contain 22% of the lands for timber production. In both zones, timber producing areas are generally scattered and isolated by steep slopes or rock cliffs. Roads construction is limited, so harvest is primarily dependent on aerial logging systems.

Description- Up to 19% of the uplands (38% saltwater and 9% interior uplands) will be managed in multi-storied, multi-aged stands interspersed with the remaining 81% of the upland zones in forested old growth. However, only 10% of the uplands are economical to log unless harvest economics vastly improve. Harvest will occur on suitable areas in the southern part of the VCU and will help meet market demand for timber products and increase the productivity of these areas for sawlogs (see Figure 1-4). Harvest will seek to concentrate units within an area when possible to minimize habitat fragmentation and improve harvest economics. Soil productivity will be maintained by applying Best Management Practices in all areas. The tree species mix will remain close to existing proportions. Forested areas which are harvested will contain a mix of uneven-aged, two-storied and some even-aged stands. Harvested upland areas next to saltwater and freshwater influence zones may leave some trees (variety of sizes and vigors) for vegetative diversity, nesting habitat and soil stability. Management of young stands will focus on producing larger, more valuable trees for sawlogs. Saltwater-facing uplands will maintain migration corridors between goat winter range and summer range and seek to retain some valuable goat winter range characteristics in areas surrounding cliffs along the steep, west face of the VCU.

Figure 1-4, Desired Vegetative Composition of the Uplands



The upland zones are rarely visited by travelers but more often viewed from marine or freshwater zones. Visitors to the Bradfield Canal may notice harvest units but they will borrow their shape and texture from the surrounding landscape. Visitors traveling within the drainages of Tom and especially Frank Creek may see a more modified landscape. Research and monitoring designed to learn about and interpret ecological and applied vegetation management practices will be pursued.

Alpine/Brushy Slopes Desired Condition

Definition- Approximately 40% (11,125 acres) of VCU 510 lies within the alpine or brushy slopes zone. This zone provides important summer range habitat for many species of wildlife and is determined by the dominant vegetative composition of rock and alpine/brush plant communities.

Description- The desired condition of this zone is the maintenance of habitat for alpine-associated wildlife species and migration corridors between the alpine and upland zones. Migration between the Campbell VCU and the adjacent VCU's of Martin Creek and the Harding River will also be maintained. Although management activities will rarely directly affect alpine areas they should seek to maintain current access and minimize disturbance during mountain goat kidding and hunting seasons. Recreation and hunting experiences will offer a high degree of risk and challenge.

Key Planning Issues

Although there are often many issues associated with the planning of a timber sale, the National Environmental Policy Act directs us to analyze in detail only those issues which are significant. This ensures that the bulk of the analysis effort and the document remains focused on the issues which are most important to the project. We identified ten issues through the public participation process which form the basis for the alternatives:

Issue One

The effects of the transportation system and harvest proposals on the productivity and function of the freshwater system.

The freshwater influence zone is a key component of the Campbell area. This zone is a link to all other zones and provides key access and habitat for many species of fish and wildlife. We will evaluate the alternatives and their effect on riparian and wetland systems by considering the number of riparian and wetland forest acres harvested, impacts of roads on wildlife corridor values, and the amount of wetlands impacted by roads. Potential risks to the aquatic system will be measured by the length of stream channels affected by harvest, length of road built and number of stream crossings, proportion of harvest in the watershed and the potential indirect effects of increased access by fishermen. We will also discuss the mitigation measures used and predict their effectiveness.

Issue Two

The effects of the transportation system on the productivity and function of beach areas.

None of the alternatives propose any harvest units within the beach fringe and estuary buffers. However, we will evaluate the direct effects of developing and operating Log Transfer Facilities, roads, sort yards and rockpits within or near these areas on eagles and other wildlife. The alternatives will be compared by the number and location of LTF's, and the length and timing of potential disturbance. Mitigation measures will also be described.

Issue Three

The effects of different methods and locations of log entry on marine fish and shellfish productivity.

Under the various alternatives we could drop logs directly into saltwater, on to a barge and/or construct Log Transfer Facilities. In total, three LTF's could be needed. The degree of influence each of these facilities on intertidal and subtidal areas will be evaluated using the Alaska Timber Task Force (ATTF) siting guidelines and by describing the amount of volume which will be handled at each site; a factor in predicting the amount of bark deposition on the marine bottom.

Issue Four

The effects of harvest proposals on species conservation.

We will model and measure the effects on a variety of management indicator species, Threatened, Endangered or Sensitive species. The various locations of old growth blocks, the degree of fragmentation, influence on important corridors and potential vegetative diversity will also be quantified. We will also evaluate how the alternatives respond to species conservation concepts. Potential cumulative effects on wildlife species will also be discussed under this issue.

Issue Five

The Impacts of harvest proposals on goat winter range, disturbance of kidding and rearing areas and travel corridors.

Goats are a high interest species within the Bradfield area. A modeling and field verification process helps identify high quality habitat areas for goats. We will evaluate the alternatives by measuring the amount and quality of goat habitat impacted by harvest in the study area and the surrounding landscape. We will also describe the impacts to vertical travel corridors.

Issue Six

The impacts of harvest and roads on brown bear habitat and harvest both during and after logging.

Brown bears are another special interest species in the Bradfield. We will evaluate the alternatives' relative effects on key travel corridors, amount and quality of habitat harvested and road density. We will also analyze the effects of disturbance during logging and the potential increase in access for hunters.

Issue Seven

The effects of harvest proposals on soil productivity.

One of the main concerns addressed by this issue is the potential for landslides and soil displacement. We will evaluate the responsiveness of the alternatives to this issue by determining the number of acres harvested and roads constructed by soil hazard class. A description of the predicted vegetative response will also be examined as part of this issue.

Issue Eight

The effects of the proposal on cultural resources and other social values in and around the study area.

Past and present uses of the area by humans reveals a pattern of "human habitats" over time. We will evaluate the relative impact that each alternative has on this pattern by evaluating potential impacts to cultural resources, subsistence, hunting and fishing, the number and kinds of changes to recreation places as well as changes to the existing visual condition of the area. Changes in the potential use of the area for Outfitter and Guides will also be analyzed as well as the relative potential for timber production.

Issue Nine

The effects of a logging camp on recreation use, fish and wildlife.

Factors such as length of road, locations of road, duration of harvest activities and numbers of personnel used to evaluate impacts in Issues 1, 6 and 8 will be used to describe the relative opportunity and access which logging personnel will have to fish and game while on site. The predicted effectiveness of the mitigation measure used to reduce the number of bears taken in defense of life will be disclosed.

Issue Ten

The economic costs and revenues of the proposals with expensive aerial logging systems being used.

The relative economic efficiency of the alternatives will be used to assess the responsiveness to this issue. We will use estimated costs and returns to the government to compare alternatives.

Issues Outside Scope of This Analysis

Several issues emerged during public involvement and interdisciplinary team meetings which could not be addressed with this project analysis. We listed them below and explain the reasons why they are beyond the scope of this analysis.

Bradfield Road Proposal- The Bradfield is an area containing many options for roads to and from Canada or Ketchikan. Many different options are proposed from roads crossing the project area to a ferry system from the end of a road at the mouth of the Bradfield River. The effects of implementing any one of these possible road alternatives combined with the effects of this potential timber sale could not be examined in detail under this analysis. Under NEPA, we are required to examine potential cumulative effects for this action and "reasonably foreseeable actions." The Bradfield Road proposals are not "reasonably foreseeable" because proposals are vague and it is not certain when or if any of these roads will be built. We do describe changes that could occur as a result of these road proposals under Planning Issues #4 and #8 but we can not quantify the cumulative effects at this time. The Bradfield Road will need to undergo its own NEPA analysis when proposals and timelines are more concrete. This analysis would quantify the cumulative effects of past, present and foreseeable actions.

Forest Plan Amendment- It was suggested during public involvement that some people did not think the study area should support a timber sale now or in the future. Current Forest Plan direction allocates the study area to a LUD IV which emphasizes timber production. An alternative to change the allocation to a LUD II or LUD III could have been considered by the Regional Forester as part of this project level analysis. Due to the fact that the Forest Plan is currently being revised, alternative management allocations for the Campbell study area are best evaluated at the Tongass National Forest planning level in order to evaluate all effects of a change in management direction for this area. The Supplement to the Draft EIS for the Tongass Land Management Plan Revision does evaluate non-development oriented alternatives for the study area. The interdisciplinary team has also passed on site specific information contained in this project level analysis to the Forest level planning team. In this project level analysis, Alternative A (the "no action" alternative) does display the effects of not harvesting timber at this time.

1 Purpose and Need

Market Demand- The market demand for timber sold off the Tongass National Forest is determined at the regional level through the Forest Planning process because the market for timber is regional in scale. Therefore, a single sale can not be evaluated for its response to market demand except in the case of very small sales (for example, <1 MMBF) where the market would be determined by a limited number of small, usually local, operators. Whether or not a sale is sold is often the best indicator that a sale is responding to market demand.

Chapter 2

Alternatives Including the Proposed Action

Chapter 2

Alternatives Including the Proposed Action

Introduction

This chapter is useful as a summary of the planning process and the effects of the various alternatives on the key issues. The following sections are included:

Alternative Development- In this section we describe the process we used to generate the alternatives.

Alternatives Eliminated from Detailed Study- We eliminated one alternative and several potential Log Transfer Facilities from detailed study. In this section we will explain our rationale.

Alternatives Considered in Detail- In this section, we describe each alternative and the strategy utilized to address the issues.

Mitigation Measures- In this section we describe the mitigation measures which we propose to implement with all action alternatives. These measures are either required by law or are measures we have chosen to implement in order to avoid impacts.

Comparison of the Alternatives- We will summarize the effects of the alternatives on the key issues within a table format where you can easily compare the tradeoffs among alternatives. The amount of harvest within each ecological zone will also be shown.

Forest Service Preferred Alternative- In this section we will identify a preferred alternative.

Alternative Development

When we develop a range of alternatives to the proposed action, two primary factors are important; the "purpose and need" for the project must be satisfied and the issues developed through public participation must be addressed. Public comments and suggestions are important to us.

How We Used Public Comments in the Alternatives

In addition to using the public comments to focus our analysis on the key planning issues, we also incorporated specific concerns into some or all of the alternatives. For example, there was some support for investigating alternatives to clearcutting (removing all the trees) in harvest units for a variety of reasons. These reasons included scenic quality, wildlife concerns or "mimicking natural regeneration processes of the forest." We responded by incorporating other harvest methods in all alternatives.

2 Alternatives

Public comments were used to develop the issues, alternatives and mitigation measures.

Another frequent comment we received was the concern that the harvest volume mentioned in the "proposed action" was not sufficient to justify the expensive helicopter systems necessary to log the sale. We responded by incorporating several alternatives that log more than the 8 MMBF described in the proposed action and attempted to make the sale as economical as possible given the strategy of each alternative. Some comments were also incorporated into the design or mitigation measures for all alternatives. For example, there was some concern expressed over the location of a logging camp in the area and the possible impacts to brown bear safety. We responded by requiring a floating camp for all alternatives in order to minimize conflicts between bears and loggers.

The preliminary alternatives were tested.

Once we had developed a preliminary range of alternatives we showed them to several persons inside and outside the Forest Service. This helped us find out if we were "on the right track" and had considered a reasonable range of alternatives. This process also helped us refine the alternatives and make them better.

Alternative P resulted from public comment on the DEIS.

The Draft Environmental Impact Statement (DEIS) was released July, 1993. Public and other agency comments were used to revise the analysis for this FEIS. Also, a new alternative, Alternative P was formulated in response to concerns about goat habitat, roads and log transfer sites.

Ecosystem Management and Alternative Development

"Ecosystem Management" ultimately comes back to people...people's values and needs and people planning activities on the land. Therefore we think public involvement and the interdisciplinary team approach are critical to ecosystem management. By focusing on key, integrated issues, we think the alternatives more naturally reflect the real tradeoffs instead of pitting "resources" against one another. By incorporating the ecological zones we can provide you with more information about how ecological systems will be affected by the alternatives.

The alternatives were developed by responding to key issues and considering different ecological zones.

We also think that an important part of ecosystem management is showing you what vegetation we intend to leave in the forest as well as what vegetation we propose to harvest with each alternative. We will also discuss how the area may be managed over time even though this EIS only makes decisions about this immediate proposal. By taking a long-term perspective we can better understand how decisions we make today will affect future options.

The more we studied the key planning issues and the Campbell area the more it seemed to us that the alternatives should vary by their geographic context. The alternatives respond to the planning issues by harvesting and retaining areas in different zones and in different geographic areas. For example, one alternative harvests in Frank Creek and retains areas in Tom Creek.

Alternatives vary in the area harvested or retained and the transportation system used.

The transportation system needed varies widely among alternatives depending on how each alternative addresses the issues. The specific boundaries of the harvest units did not vary among alternatives because we were able to design the harvest boundaries or change the harvest method to address specific site concerns.

Alternatives Eliminated from Detailed Study

An alternative to only harvest in Tom Creek was dropped because of wildlife impacts and poor economics.

Initially we developed Alternative C to only harvest timber within the Tom Creek watershed and retain areas along the saltwater face. This alternative was designed to minimize forest fragmentation by harvesting in areas already dissected by muskeg openings. However, this alternative had a high impact on key wildlife habitat and corridors. Also, suitable areas for harvest are so scattered that three miles of road was needed to harvest only 5.7 MMBF. Due to the impacts of the proposal and the poor economics of timber harvest, this alternative was dropped from further study.

Several LTF sites were dropped from further study.

Eight sites for Log Transfer Facilities were evaluated by the planning team. Only three sites (one within each geographic area) were carried forward into the alternatives. The other five sites were dropped for the following reasons;

We dropped two sites at the mouth of Frank Creek from further consideration. The first was located right at the mouth of the creek, adjacent to an eagle nest tree. This site also required us to cross the creek with a long bridge because the LTF was located on the west side of the creek. The other site was located at the mouth of another small fish stream just east of Frank Creek. We felt these two sites had more environmental effects than the third Frank Creek site which was incorporated into the alternatives.

The third site dropped from further study was located just outside what is commonly referred to as "hollywood bowl" roughly half way between Frank and Tom Creek. This site had few fishery concerns but accessed little volume because a road was not feasible from this location up either Frank or Tom Creeks.

The fourth site dropped was located at the mouth of Tom Creek. The high estuary values, expense of road building and the risk of the road failing directly into Tom Creek were the reasons we dropped this site.

The fifth site dropped was located in the bay just east of Tom Creek. We eliminated this site due to the presence of a cultural site and because this site offered less advantages over a nearby site for log storage.

Alternatives Considered in Detail

This section describes each alternative. We first describe how the alternative was designed to address the issues. Then we describe the acres and units of harvest, the acres of old growth habitat retained and the transportation system which would be needed to log each alternative.

2 Alternatives

Habitat Managed to Provide Old-Growth Conditions

The current Tongass Land Management Plan, requires that old-growth habitat be provided to achieve wildlife habitat goals. The TLMP provides estimates of the percentage of area in several habitat categories that we anticipate are needed to meet these goals. These areas were identified for each alternative by the team and are displayed on the alternative maps. Since there are different harvest strategies there are also different old-growth management strategies depending on how the alternative responds to the key issues. However, since the Saltwater Influence Zone has the greatest overall value for wildlife, this area was favored for the retention of old growth areas.

Harvest Method Rationale

The Chief of the Forest Service in a letter dated June 4, 1992 has directed that the national forest system will reduce clearcutting by 70% over the next few years. The reduced emphasis on clearcutting, the need to manage a variety of resources in the study area (see Planning Issues, Chapter 1), required planning and layout timeframes, broken topography, isolated patches of suitable timber land and the need to use helicopters, led us to consider different harvest methods in the study area. It became clear to us that old ways of thinking and doing business could give way to the challenge of meeting multiple objectives and resolving conflicts.

Clearcutting was not our preferred method of harvest regeneration.

Traditional harvest in Southeast Alaska relies heavily on clearcutting to regenerate a new stand. Clearcutting usually removes all trees over 9 inches in diameter but yarding with cable systems usually will knock over or uproot most of the remaining trees. This method converts "old growth" which is maintaining or losing wood fiber into young growing trees which are producing wood. Clearly we could have chosen to continue to use more of this type of harvest method and some may wish we did. We favored different harvest methods for the above reasons but want to let you know that there is little concrete data available on what the results will be like. We have used our best predictive abilities to describe what we think will happen.

Overstory removal is the method most used along with group selection and patch-cutting.

Although somewhat experimental, we think that "overstory removal" may offer a way to increase timber productivity over more acres in each entry, manage a larger part of the scenery without creating noticeable "patches," increase the diversity of future stands while reducing leave tree losses to blowdown, improve the economics of helicopter harvest and maintain the stability of the soil over time. If it works, we may have a viable way of harvesting other difficult areas like the Campbell landscape or even more of the landscape. If it fails, we will have learned something for the next time. In this document we have disclosed the effects of both possible outcomes. In some cases (such as the estimates of effects on wildlife) we have modeled the effects of overstory harvest as if it were a clearcut. This discloses the effects under a scenario where all leave trees would be damaged or blow over.

Overstory removal harvest removes the larger diameter trees or overstory, leaving the smaller diameter trees in the harvest unit. On the proposed Campbell Timber Sale, trees 12" or 16" in diameter or less would be left standing after harvest. Trees with a diameter greater than 12" or 16" would be harvested. Some of the units would also contain scattered, larger diameter "leave trees" to add even greater diversity to the remaining stand of trees.

Group selection (harvest less than 2 acres in size) and **patch cutting** (harvest 2-10 acres in size) were sometimes our selected harvest method to respond to a specific issue (such as goat habitat or fragmentation) or ways of harvesting timber off forested areas that were patchy or broken by cliffs.

Alternative A

The "No Action" Alternative

This alternative discloses the effects of not harvesting in the project area at this time and is required by NEPA. It assumes no change in the current management and would propose no further development at this time. This alternative also serves as a basis of comparison for the "action" alternatives. This alternative would provide for the continuation of existing recreation uses of the area which are dependent on a natural appearing, scenic landscape and semi-primitive or primitive experiences. Outfitting and guiding operations would only be limited by other circumstances such as competition with each other or regulations. The project area would continue to be predominated by relatively unfragmented, old growth vegetation which would benefit several species, particularly goats, goshawks, marten and murrelets. There would be no temporary disturbance of brown bear, goat or fish habitat. Intertidal areas would remain undisturbed. The economic advantage of this alternative could be to leave the area as it is until harvest economics or technologies improved.

Alternative B

Would harvest in Frank Creek and reserve areas along the West Face and Tom Creek.

This alternative represents the "proposed action" outlined in Chapter 1. We designed this alternative to harvest timber in the area with the least amount of change to the existing "human habitats" of the west face and Tom Creek. This alternative minimizes fragmentation of the corridor between the study area and the Marten Creek watershed which also minimizes the effects on high quality goat habitat. Under this alternative we favored retaining old growth areas along the West Face to complement this objective (some retained areas could instead be concentrated in Tom Creek to allow a future entry along the West Face). There is only one watershed affected by this alternative which reduces the risk to the freshwater zone and the species of fish and wildlife that rely on it. A single harvest entry is expected in Frank Creek since we propose to harvest most of the suitable areas. The road would therefore be closed and the LTF rehabilitated. The harvest operation is concentrated within a small area which helps reduce logging costs.

Table 2-1, Alternative B Features

Features	Amount/Location
Total Harvest Acres	284 acres
Total Old Growth Retained	960 acres, mostly in West Face and saltwater influence zone.
Potential Future Harvest Entry	Tom Creek or West Face depending on old growth strategy.
Total Harvest Volume	7.0 MMBF
Total Miles of Road	1.3 Miles
Log Transfer Facility	Frank Creek

FIG. 2-1, ALTERNATIVE B

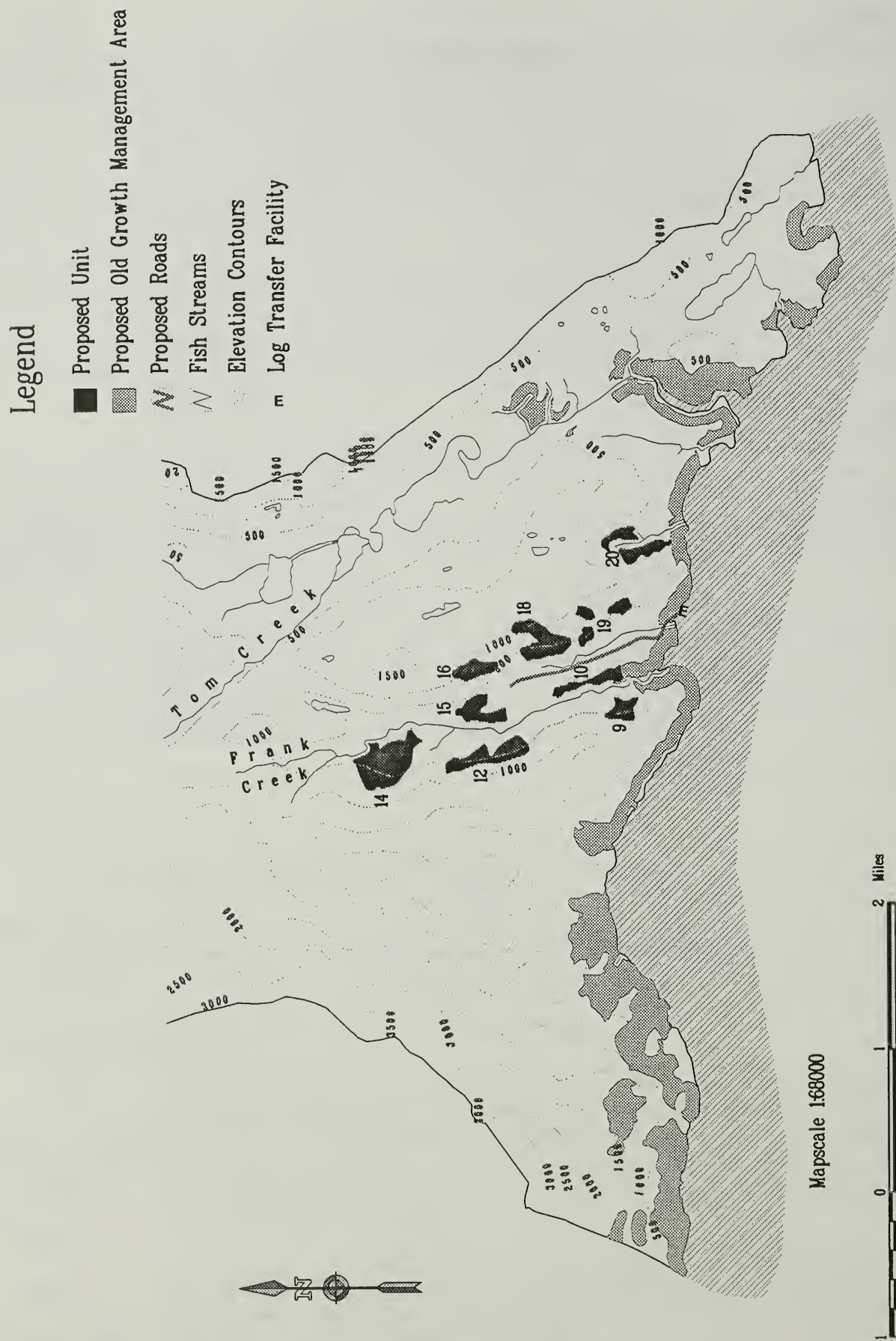


Table 2-2, Alternative B Harvest Units

Unit # and Method	Harvest Area Size	Net Volume
#9, Overstory Removal w/ Leave Trees	16	448 Mbf
#10, Overstory Removal	20 acres	500 Mbf
#12, Overstory Removal w/ Leave Trees	39 acres	1014 Mbf
#14, Overstory Removal w/ Leave Trees	70 acres	1680 Mbf
#15, Overstory Removal w/ Leave Trees	26 acres	546 Mbf
#16, Overstory Removal	20 acres	500 Mbf
#18, Overstory Removal	41 acres	1148 Mbf
#19, Patch Cut	3 patches totaling 22 acres within 111 acre area.	501 Mbf
#20, Overstory Removal	30 acres	660 Mbf
TOTAL	284 acres cut, 373 acres treated	7.0 MMBF

2 Alternatives

Alternative D

Would harvest the West Face and retain the interior uplands.

We designed this alternative to eliminate the need for roading and have all harvested timber flown by helicopter to a landing, barge or water drop. Areas set aside to retain old growth habitats were located in the interior uplands of Frank and Tom Creek (Figure 2-2 shows the retained areas in Frank Creek but another option could favor retaining some areas in Tom Creek as shown for Alternatives F and G). Risk to the marine and freshwater systems of Frank and Tom Creek are minimized but there would be effects to goat habitat and noticeable changes to the viewshed of the Bradfield Canal because most of the harvest occurs in the saltwater-facing zone. A single harvest entry is expected on the west face since most of the suitable lands are harvested in this zone. The lack of roading and one LTF increases the economic efficiency and reduces the effects on brown bear. The LTF would be rehabilitated. Potential future harvest entries could occur in Frank or Tom Creek depending on alternative strategies of retaining old growth areas over time.

Table 2-3, Alternative D Features

Features	Amount/Location
Total Harvest Acres	434 acres
Total Old Growth Retained	960 acres in Frank or Tom Creek
Potential Future Harvest Entry	None likely
Total Harvest Volume	10.5 MMBF
Total Miles of Road	0 Miles
Log Transfer Facility	West Face

FIG. 2-2, ALTERNATIVE D



Table 2-4, Alternative D Harvest Units

Unit # and Method	Harvest Area Size	Net Volume
#1, Overstory Removal	11 acres	297 Mbf
#2, Overstory Removal	12 acres	324 Mbf
#3, Overstory Removal w/Exclusions	44 acres	1188 Mbf
#4, Overstory Removal w/Leave Trees	50 acres	1350 Mbf
#5, Overstory Removal w/Leave Trees	47 acres	1034 Mbf
#6, Overstory Removal w/Leave Trees	36 acres	828 Mbf
#7, Overstory Removal w/Leave Trees	60 acres	1500 Mbf
#8, Overstory Removal	21 acres	483 Mbf
#9, Overstory Removal	16 acres	432 Mbf
#10, Overstory Removal	20 acres	440 Mbf
#19, Patch Cut	3 patches totaling 22 acres within 111 acre area	479 Mbf
#20, Overstory Removal	30 acres	630 Mbf
#21, Overstory Removal w/Leave Trees	28 acres	644 Mbf
#22, Overstory Removal	37 acres	851 Mbf
TOTAL	434 acres cut, 523 acres treated	10.5 MMBF

Alternative E

Would harvest the West Face, Frank and Tom Creeks and disperse retained areas.

This alternative disperses harvest and retention throughout the project area. This alternative also represents our view of the maximum area capable of being harvested within the project area under Forest Plan direction, present technology and market conditions. This alternative would fragment old growth blocks within the project area. We would therefore rely on blocks of old growth habitat in the Harding and Marten Creek watersheds to supply the needs for these conditions in the north Bradfield landscape. This alternative would have the most effect on the freshwater and upland zones and therefore a greater effect on wildlife and fish habitat. Because the transportation system required is so extensive, development costs are high and the impacts to the saltwater and marine zones are greatest. Roads would be closed and rehabilitated. This alternative would implement the greatest degree of change to the established pattern of use by people, increase access and benefit those looking for a roaded, hike-in recreation experience. Increased access would affect wildlife populations, particularly brown bears. A single harvest entry would be expected over the entire project area.

Table 2-5, Alternative E Features

Features	Amount/Location
Total Harvest Acres	884 acres
Total Old Growth Retained	960 acres;scattered
Potential Future Harvest Entry	None for Rotation
Total Harvest Volume	20.5 MMBF
Total Miles of Road	4.6 Miles
Log Transfer Facilities	Frank & Tom Creeks & West Face

FIG. 2-3, ALTERNATIVE E

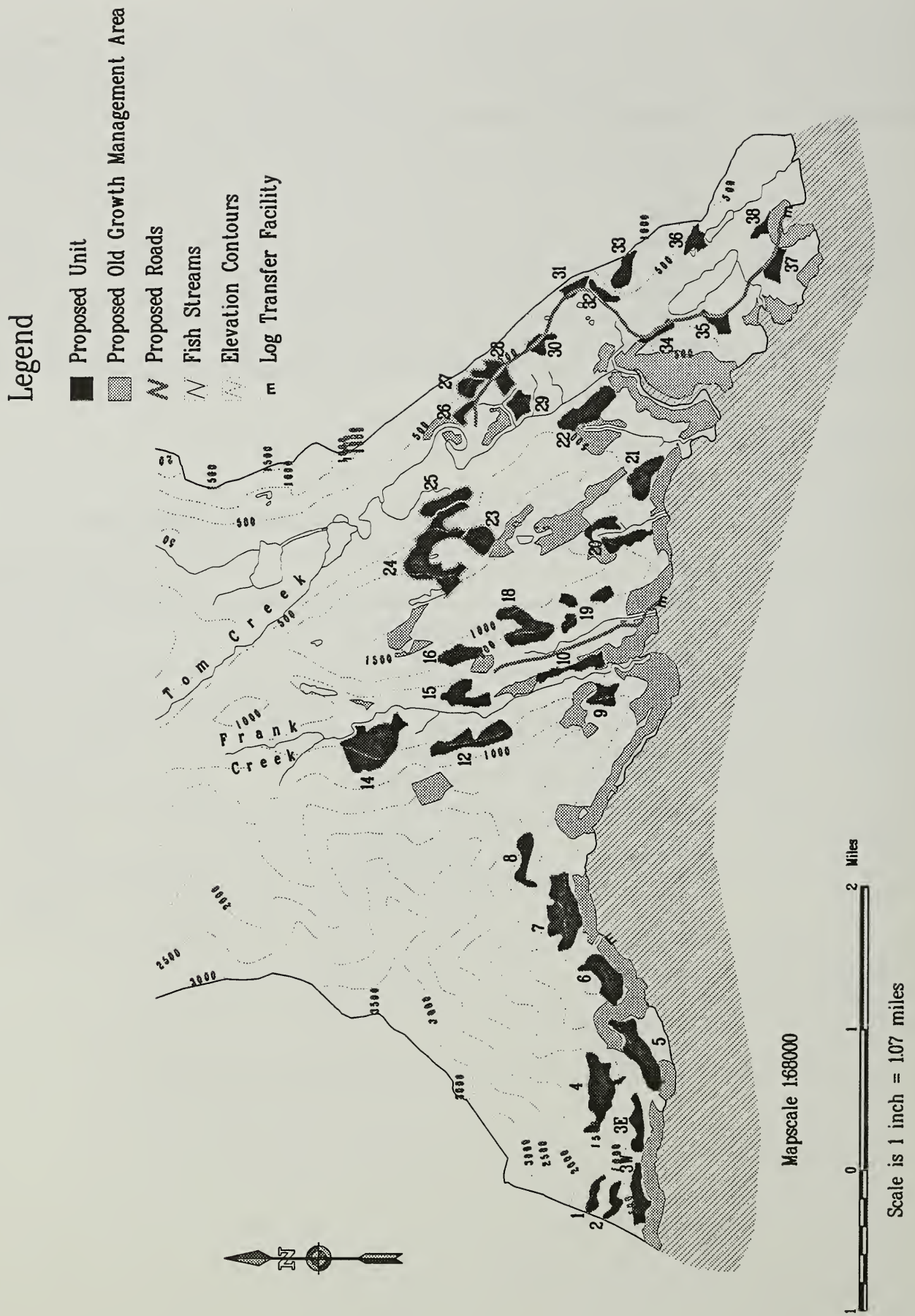


Table 2-6, Alternative E Harvest Units

Unit # and Method	Harvest Unit Size	Net Volume
#1, Overstory Removal	11 acres	297 Mbf
#2, Overstory Removal	12 acres	324 Mbf
#3, Overstory Removal w/Exclusions	44 acres	1188 Mbf
#4, Overstory Removal w/Leave Trees	50 acres	1350 Mbf
#5, Overstory Removal w/Leave Trees	47 acres	1034 Mbf
#6, Overstory Removal w/Leave Trees	36 acres	828 Mbf
#7, Overstory Removal w/Leave Trees	60 acres	1500 Mbf
#8, Overstory Removal	21 acres	483 Mbf
#9, Overstory Removal	16 acres	448 Mbf
#10, Overstory Removal	20 acres	500 Mbf
#12, Overstory Removal w/Leave Trees	39 acres	1014 Mbf
#14, Overstory Removal w/Leave Trees	70 acres	1680 Mbf
#15, Overstory Removal w/Leave Trees	26 acres	546 Mbf
#16, Overstory Removal	20 acres	500 Mbf
#18, Overstory Removal	41 acres	1148 Mbf
#19, Patch Cut	3 patches totaling 22 acres within 111 acre area	492 Mbf
#20, Overstory Removal	30 acres	630 Mbf
#21, Overstory Removal w/Leave Trees	28 acres	644 Mbf
#22, Overstory Removal	37 acres	962 Mbf
#23, Overstory Removal	22 acres	462 Mbf

Table 2-6, Alternative E Harvest Units (continued)

Unit # and Method	Harvest Unit Size	Net Volume
#24, Patch Cut	5-8 acre patches totaling 40 acres within a 82 acre area.	1000 Mbf
#25, Overstory Removal	23 acres	460 Mbf
#26, Clearcut, High-lead	10 acres	120 Mbf
#27, Overstory Removal w/Exclusions	13 acres	260 Mbf
#28, Clearcut, High-lead	26 acres	520 Mbf
#29, Clearcut, Helicopter	14 acres	280 Mbf
#30, Clearcut, High-lead	12 acres	192 Mbf
#31, Clearcut, High-lead	10 acres	200 Mbf
#32, Clearcut, High-lead	10 acres	160 Mbf
#33, Overstory Removal	16 acres	320 Mbf
#34, Clearcut, High-lead	9 acres	189 Mbf
#35, Clearcut, High-lead	13 acres	234 Mbf
#36, Overstory Removal	13 acres	130 Mbf
#37, Clearcut, High-lead	16 acres	256 Mbf
#38, Clearcut, High-lead	7 acres	112 Mbf
TOTAL	884 acres cut, 1015 acres treated	20.5 MMBF

Alternative F

Would harvest the West Face and Frank Creek and retain Tom Creek.

The objective of this alternative is to make a single entry into the project area and concentrate retained old growth acres within the Tom Creek watershed. This alternative would fragment existing blocks of old growth within the project area. We would rely on blocks within the Harding and Marten Creek watersheds to supply this habitat in the north Bradfield landscape. This alternative would predominantly affect the west face and the freshwater and upland zones of Frank Creek. There would be a noticeable change in the landscape as viewed from the Bradfield Canal. The road would be closed and LTF rehabilitated. The established pattern of use would remain unchanged in the Tom Creek watershed while roaded, hike-in recreation opportunities would be enhanced in Frank Creek. Since access is not increased in the Tom Creek drainage important brown bear habitat is retained.

Table 2-7, Alternative F Features

Features	Amount/Location
Total Harvest Acres	565 acres
Total Old Growth Retained	960 acres;scattered
Potential Future Harvest Entry	None in Rotation
Total Harvest Volume	14 MMBF
Total Miles of Road	1.3 Miles
Log Transfer Facility	Frank Creek & West Face

FIG. 2-4, ALTERNATIVE F



Table 2-8, Alternative F Harvest Units

Unit # and Method	Harvest Area Size	Net Volume
#1, Overstory Removal	11 acres	297 Mbf
#2, Overstory Removal	12 acres	324 Mbf
#3, Overstory Removal w/Exclusions	44 acres	1188 Mbf
#4, Overstory Removal w/Leave Trees	50 acres	1350 Mbf
#5, Overstory Removal w/Leave Trees	47 acres	1034 Mbf
#6, Overstory Removal w/Leave Trees	36 acres	828 Mbf
#7, Overstory Removal w/Leave Trees	60 acres	1500 Mbf
#8, Overstory Removal	21 acres	483 Mbf
#9, Overstory Removal	16 acres	448 Mbf
#10, Overstory Removal	20 acres	500 Mbf
#12, Overstory Removal w/Leave Trees	39 acres	1014 Mbf
#14, Overstory Removal w/Leave Trees	70 acres	1680 Mbf
#15, Overstory Removal w/Leave Trees	26 acres	546 Mbf
#16, Overstory Removal w/Leave Trees	20 acres	500 Mbf
#18, Overstory Removal	41 acres	1148 Mbf
#19, Patch Cut	3 patches totaling 22 acres within 111 acre area	501 Mbf
#20, Overstory Removal	30 acres	660 Mbf
TOTAL	565 acres cut, 654 acres treated	14.0 MMBF

2 Alternatives

Alternative G

Would harvest the West Face (w/ Group Selection) and Frank Creek and retain Tom Creek.

The objective of this alternative is to make a single entry within Frank Creek but regenerate the West Face over time using group selection and retain old growth acres within the Tom Creek watershed. Three harvest entries would be expected on the West Face over time using group selection to remove 1/3 of the timber on suitable lands each time. This alternative would have similar effects as Alternative F except the group selection harvest method would reduce fragmentation of the West Face and effects to key goat habitat during this entry. There would also be little noticeable change in the landscape as viewed from the Bradfield Canal. The road up Frank Creek would be closed and the LTFs rehabilitated.

Table 2-9, Alternative G Features

Features	Amount/Location
Total Harvest Acres	396 acres
Total Old Growth Retained	960 acres;scattered
Potential Future Harvest Entry	West Face
Total Harvest Volume	9.7 MMBF
Total Miles of Road	1.3 Miles
Log Transfer Facility	Frank Creek & West Face

FIG. 2-5, ALTERNATIVE G

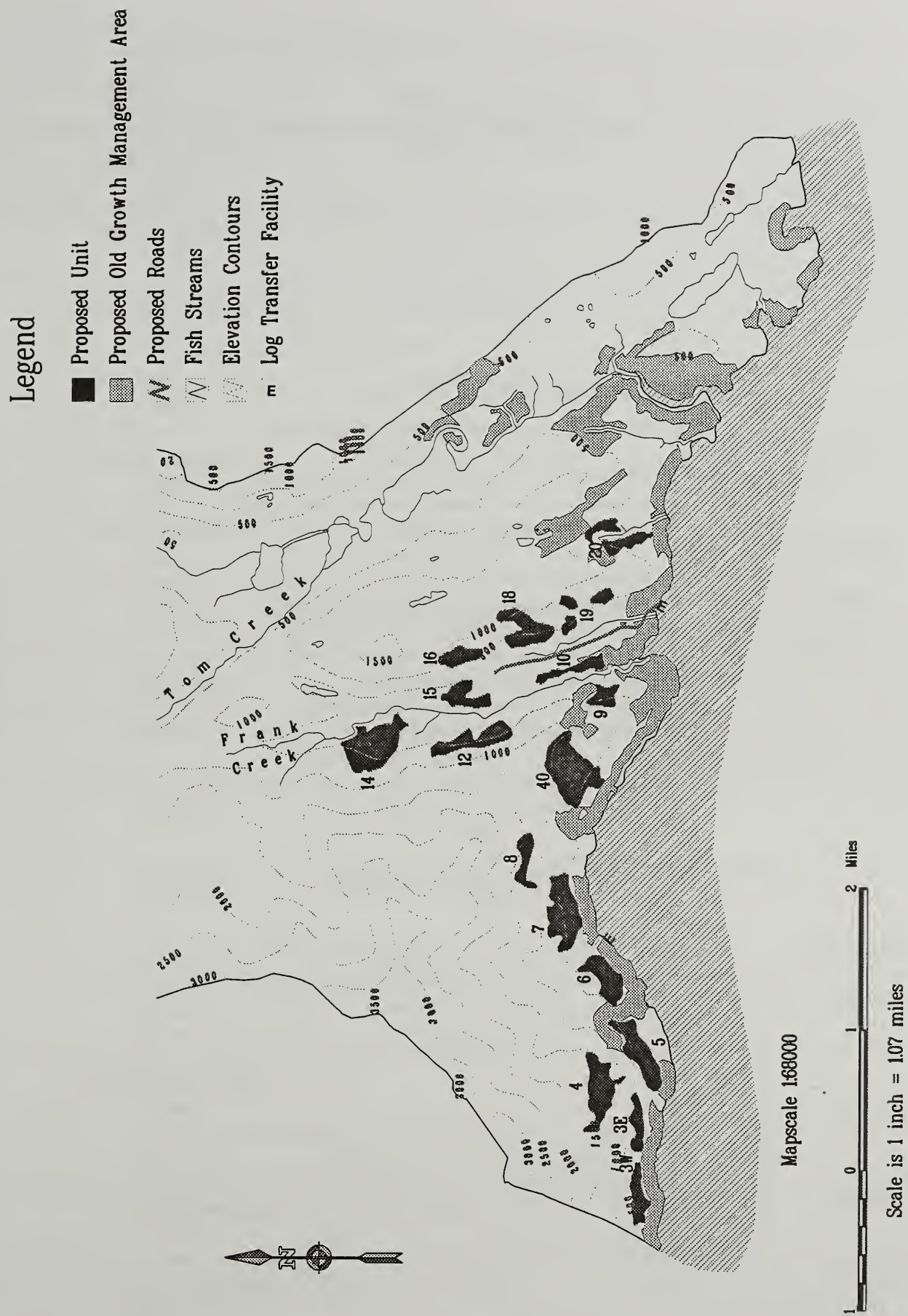


Table 2-10, Alternative G Harvest Units

Unit # and Method	Harvest Acres	Net Volume
#3, Group Selection	15 acres in 52 acre area	435 Mbf
#4, Group Selection	16 acres in 58 acre area	464 Mbf
#5, Group Selection	18 acres in 55 acre area	450 Mbf
#6, Group Selection	14 acres in 44 acre area	350 Mbf
#7, Group Selection	21 acres in 56 acre area	567 Mbf
#8, Group Selection	8 acres in 22 acre area	200 Mbf
#9, Overstory Removal w/Leave Trees	16 acres	448 Mbf
#10, Overstory Removal	20 acres	500 Mbf
#12, Overstory Removal w/Leave Trees	39 acres	1014 Mbf
#14, Overstory Removal w/Leave Trees	70 acres	1680 Mbf
#15, Overstory Removal w/Leave Trees	26 acres	546 Mbf
#16, Overstory Removal	20 acres	500 Mbf
#18, Overstory Removal	41 acres	1148 Mbf
#19, Patch Cut	3 patches totaling 22 acres within 111 acre area	501 Mbf
#20, Overstory Removal	30 acres	660 Mbf
#40, Group Selection	20 acres in 82 acre area	240 Mbf
TOTAL	396 acres cut, 742 acres treated	9.7 MMBF

Alternative P

Was based on public comment on the DEIS.

This alternative was formulated from public and other agency comments on the Draft EIS by striking a compromise combining the best features of Alternatives D and Alternatives F by eliminating road construction, reducing the harvest of high value, goat winter range, and only developing one LTF. This alternative would fragment existing blocks of old growth within the project area. We would rely on blocks within the Harding and Marten Creek watersheds to supply this habitat in the north Bradfield landscape. Since access is not increased in the Tom or Frank Creek watershed, important brown bear habitat is retained. Harvested timber would be flown by helicopter to either an LTF, barge or dropped in the water. Areas set aside to retain old growth habitats were located in the interior uplands and the West Face. There will be noticeable changes to the viewshed of the Bradfield Canal because most of the harvest occurs in the saltwater-facing zone. A single harvest entry is expected. Potential future harvest entry could occur in Tom Creek.

Table 2-11, Alternative P Features

Features	Amount/Location
Total Harvest Acres	476 acres
Total Old Growth Retained	960 acres;scattered
Potential Future Harvest Entry	None in Rotation
Total Harvest Volume	11.6 MMBF
Total Miles of Road	None
Log Transfer Facility	West Face

Table 2-12, Alternative P Harvest Units

Unit # and Method	Harvest Area Size	Net Volume
#3, Overstory Removal	20 acres	540 Mbf
#4, Overstory Removal w/Leave Trees	50 acres	1350 Mbf
#5, Overstory Removal w/Leave Trees	47 acres	1034 Mbf
#6, Overstory Removal w/Leave Trees	36 acres	828 Mbf
#7, Overstory Removal w/Leave Trees	60 acres	1500 Mbf
#8, Overstory Removal	21 acres	483 Mbf

FIG. 2-6, ALTERNATIVE P



Table 2-12, Alternative P Harvest Units (continued)

Unit # and Method	Harvest Area Size	Net Volume
#9, Overstory Removal	16 acres	448 Mbf
#10, Overstory Removal	20 acres	440 Mbf
#12, Overstory Removal w/Leave Trees	39 acres	1014 Mbf
#15, Overstory Removal w/Leave Trees	26 acres	546 Mbf
#16, Overstory Removal w/Leave Trees	20 acres	500 Mbf
#18, Overstory Removal	41 acres	1148 Mbf
#19, Patch Cut	3 patches totaling 22 acres within 111 acre area	501 Mbf
#20, Overstory Removal	30 acres	660 Mbf
#21, Overstory Removal w/Leave Trees	28 acres	644 Mbf
TOTAL	476 acres cut, 565 acres treated	11.6 MMBF

Mitigation Measures

Mitigation measures are used to avoid impacts.

The Forest Service uses a variety of mitigation measures in the design and implementation of timber sales to avoid or reduce impacts to the environment. Some of these mitigation measures are required by law; for example, streamside buffers. Some mitigation measures are included in our policies or the Forest Plan. Other measures are very specific to a location or unit. These actions and their site-specific application are documented on the unit and road cards in Appendix A. Described below are the mitigation measures we will use for this project under all action alternatives.

Cultural Resources

Based on inventory work in the Campbell area and elsewhere in southeast Alaska, we developed a model to locate those areas where cultural resources are likely to be found. In addition to providing a basis for the comparison of alternatives, this model helps identify areas where we will intensively survey for cultural sites prior to any ground disturbing activity. If additional cultural resources are located, appropriate mitigation and protection will be designed in consultation with the Alaska State Historic Preservation Officer.

Wild and Scenic Rivers

The Harding River which lies outside of the project area has been determined to be eligible for inclusion in the Wild and Scenic River System. No harvest or related activities will be occurring within the watershed of this river. We will also protect the scenic values for which this river has been identified as eligible.

Best Management Practices

Best Management Practices (BMP's) are an extensive set of practices and operating procedures for activities conducted on the National Forest. The BMP's are the result of extensive effort between the Forest Service and the State of Alaska to identify practices that will assure timber harvest activities protect water quality to State standards and protect the soil resource. Specific BMP's we will implement for this project are described on unit and road cards in Appendix A.

Stream-Side Buffers

The Tongass Timber Reform Act mandates a minimum 100 foot buffer on all Class I streams and on those Class II streams that flow directly into Class I streams. Lakes are also protected by buffers. Some streamside buffers in this project are wider than 100 feet in response to site-specific conditions such as the stream channel type and the width of the floodplain. Specific information about streamside buffers is located on the unit cards in Appendix A. Past experience has shown that these buffers are effective in providing shading, bank stability and a continued supply of large wood; key elements in maintaining the productivity of the freshwater system.

Marbled Murrelets

Marbled murrelets are known to occur in the waters around the project area. No known nests have been located. If a nest is located, we will implement a minimum 30 acre buffer surrounding the nest. Roads may be built through this buffer only if it is unavoidable and will be located the furthest distance from the nest site.

Goshawks

Goshawks may have been sited in the project area but no nests have been located. The goshawk is not presently classified as Threatened or Endangered nor is it recognized as a Regional Sensitive Species, therefore there are currently no specific standards for protecting goshawk nests or habitat. If a goshawk nest should be found in the study area during this project we will implement the recommendations in the "Interim Habitat Management Recommendations for the Northern Goshawk; Tongass National Forest 1992." A copy of these guidelines is available from the Stikine Area Forest Supervisor's office in Petersburg, AK.

Key Wildlife Habitats

Several mitigation measures are expected to be effective in protecting key wildlife habitats within the project area. Many of the more site-specific mitigation measures are described on the unit and road cards in Appendix A. The hunting, timing and helicopter mitigation measures will be observed unless consultation with Forest Service and other agency wildlife biologists determine that circumstances have changed which make these measures unnecessary. These mitigation measures include the following:

There is no harvest in beach fringe or estuary areas.

No harvest is scheduled within the saltwater-influence zone. This zone consists of beach fringe and estuary habitats. Minimum clearing widths are employed on all roads and facilities located within this zone. In addition, we located sort yards out of this zone whenever possible.

2 Alternatives

Areas of suitable forest land are designated to provide old growth habitat.

Blocks of old growth habitat have been designated in the VCU for each alternative and are shown on the alternative maps. These blocks are designated according to Forest Plan direction and consist of a percentage of the suitable forest land in the project area. Harvest and roading is precluded in these areas which help provide continuous habitat for species which depend on old growth habitat conditions for all or part of their life cycle. More old growth areas are located in areas which are classified as unsuitable for timber harvest.

Roads will be closed after harvest.

All roads built in the project area will be closed at or near their point of origin in order to decrease the opportunity for motorized access after the project is implemented. An area where road construction has cut into the hillside will be selected and the sideslope re-established with fill for the visible distance. This measure will be effective in eliminating motorized use including ATV's but will not reduce hike-in use which will have been made easier under alternatives with planned roads. We are using road closures mainly to protect bears and furbearers from increases in hunting and trapping which can happen from increased road access.

Brown bear hunting closures will be recommended.

The Forest Supervisor will be making a recommendation to close the harvest area to brown bear hunting during the seasons that the sale is active. This recommendation will be made to the Federal Subsistence Board and may occur jointly with the Alaska Department of Fish and Game who have jurisdiction over hunting seasons. This measure would be taken to protect bears from harvest during the logging of the sale.

Restrictions on the timing of activities will occur in certain areas.

Yarding of units (#1,2,4,8 & 13) located on the West Face will not occur between January 1 through June 30 in order to protect possible goat kidding and rearing areas. Written concurrence from the US Fish and Wildlife Service will be required for repeated flights within 1/4 mile or blasting within 1/2 mile of active eagle nests.

Falling and yarding of units #9, 10, 12, 15, 22, 26 & 29 in the Tom and Frank Creek watersheds will not occur from March 15 through June 15 in order to protect possible goose nesting areas. Sale contract will encourage felling and yarding of these units within one operating season.

Helicopter guidelines will be used.

Guidelines for the operation of helicopters used to yard logs out of harvest units will be used in the timber sale contract to ensure that wildlife are not harassed by over-flights. These guidelines include; 1) All nests trees will be considered active from March 1 to May 31 and from June 1 to August 31, trees with nests containing young will be considered active. Repeated helicopter flights within 1/4 mile of active eagle nests will be avoided. 2) Helicopters will maintain at least 1,000 foot vertical and horizontal distance from visible mountain goats. There will be no sightseeing of goats. 3) The helicopter operating season of the West Face area to protect goat winter range habitat will extend from May 1 through October 31.

Logging Camp

We will require a floating camp for this sale instead of a land based camp to address concerns over bear-human interactions. A floating camp is an effective method of preventing bears from becoming habituated to food and reducing the loss of bears that are shot in defense of life or property. The contractor will need to obtain the necessary permits from the State of Alaska to ensure compliance with water quality standards.

Log Drops and Storage

Storage of logs within log booms and drops of logs into saltwater will take place in greater than 60' of water. Logs dropped directly into saltwater will be dropped within the confines of log booms.

Comparison of the Alternatives

This comparison of alternatives draws together the conclusions we make from analysis presented throughout this document. Table 2-11 shows the characteristics of each alternative. Table 2-12 describes the amount of activity within each zone by alternative. Table 2-13 compares each alternative to the key planning issues. These three charts enable you to see clearly the tradeoffs between alternatives.

Table 2-13, Alternative Characteristics

Character	Alt.A	Alt.B	Alt.D	Alt.E	Alt.F	Alt.G	Alt.P
Acres Harvested	0	284	434	884	565	396	476
Old Growth Acres Retained & Emphasis	N/A	960, West Face & Tom Creek	960, Interior Uplands	960, Dispersed	960, Tom Creek	960, Tom Creek	960, West Face & Tom Creek
Harvest Volume (MMBF)	0	7.0	10.5	20.5	14.0	9.7	11.6
Miles of Road	0	1.3	0	4.6	1.3	1.3	0
LTF Sites	0	1, Frank Creek	1, West Face	3, All	2, Frank Creek and West Face	2, Frank Creek and West Face	1, West Face

Table 2-14, Activity In Zones

Zone	Alt.A	Alt.B	Alt.D	Alt.E	Alt.F	Alt.G	Alt.P
Marine	None	1 LTF	1 LTF, Barge & Water Drops	3 LTF, Barge & Water Drops	2 LTF, Barge & Water Drops	2 LTF, Barge & Water Drops	1 LTF, Barge & Water Drops
Saltwater Influence	None	1 LTF,.3 Miles Road	1 LTF	3 LTF,.7 Miles Road	2 LTF,.3 Miles Road	2 LTF,.3 Miles Road	1 LTF
Fresh Water Influence	None	28 Acres Harvest, 1 Mile Road	66 Acres Harvest	166 Acres Harvest 3 Miles Road	74 Acres Harvest 1 Mile Road	52 Acres Harvest 1 Mile Road	52 Acres Harvest
Upland Saltwater Facing	None	141 Acres Harvest	353 Acres Harvest	502 Acres Harvest .7 Miles Road	376 Acres Harvest	229 Acres Harvest	359 Acres Harvest
Interior Upland	None	115 Acres Harvest	14 Acres Harvest	216 Acres Harvest .2 Mile Road	115 Acres Harvest	115 Acres Harvest	65 Acres Harvest

Table 2-15, Alternative-Issue Comparison Chart

Alternative	Issue One- Freshwater Areas	Issue Two- Beach Areas	Issue Three- Marine Areas
Alternative A	No effect on existing riparian, freshwater aquatic or wetland conditions.	No impacts to beach areas.	No impacts to marine areas.
Alternative B	Harvests 28 acres riparian habitat; impacts wildlife corridor values in Frank Creek; Harvests along 1.3 miles of stream; Builds 1.3 miles of road in Frank Creek watershed; 2 stream crossings; Harvests 5% of Frank Creek watershed; enables increased fishing access to Frank Creek; six acres forested wetlands harvested; 2.6 acres of wetland impacted by road.	Construction and operation of 1 LTF near Frank Creek estuary; estimated duration of activity 1 year.	Uses only Frank Creek LTF which meets only six of twelve ATTF guidelines; 7.0 MMBF would be watered.
Alternative D	Harvests 66 acres of riparian habitat mostly along Class III streams; least effect on riparian corridors other than Alt. A; Harvests along 2.2 miles of stream; no road or stream crossings; Harvests 1% of Frank and <1% Tom Creek watersheds; least risk to fish other than Alt. A; no increased access to Tom or Frank Creek; no wetlands impacted.	Construction and operation of 1 LTF on west face; estimated duration of activity 1 year; least effect overall except Alt A.	Uses West Face LTF which meets most of twelve ATTF guidelines; 10.5 MMBF would be watered and dewatered at this site.
Alternative E	Most riparian acres harvested (166); Most effect on riparian corridors especially Tom Creek area; Harvests along 4.4 miles of stream; 4.6 miles of road with 6 stream crossings; Harvests 5% of Frank, and 1% Tom Creek watershed; most risk to fish; increased fishing access to Tom and Frank Creeks; 33 acres forested wetlands harvested; 8.7 acres of wetland impacted by roads.	Construct and operate 3 LTFs; duration of activity 2 years; most impact overall to beach areas.	Uses all three LTF's to water and dewater 20.5 MMBF. Creek LTF site which meets most of ATTF siting guidelines. Other LTF's water/dewater same as under Alt. F.

Table 2-15, Alternative-Issue Comparison Chart (continued)

Alternative	Issue One- Freshwater Areas	Issue Two- Beach Areas	Issue Three- Marine Areas
Alternative F	Harvests 74 acres of riparian habitat; impacts riparian corridor values in Frank Creek; Harvests along 2.9 miles of stream; 1.3 miles of road in Frank Creek watershed with 2 stream crossings; Harvests 5% of Frank watersheds; second greatest risk to fish; enables increased fishing access to Frank Creek; six acres forested wetland harvested; 2.6 acres of wetlands impacted by roads.	Construct and operate 2 LTFs; duration of activity 1-2 years; second greatest impact on beach areas.	Uses Frank and West Face LTF's to water 7.0 MMBF at Frank Creek and water/dewater 7.0 MMBF at West Face.
Alternative G	Harvests 52 acres of riparian habitat; impacts riparian corridors in Frank Creek; areas harvested lie along 3.2 miles of stream but west face units are group selection; 1.3 miles of road in Frank Creek watershed with 2 stream crossings; Harvests 5% of Frank watershed; enables increased fishing access to Frank Creek; 26 acres of wetland harvested; 2.6 acres of wetlands impacted by roads.	Construct and operate 2 LTF's; duration of activity 1-2 years.	Uses Frank and West Face LTF's to water 7.0 at Frank Creek and water/dewater 3 MMBF at West Face.
Alternative P	Harvests 52 acres of riparian habitat; impacts riparian corridors in Frank Creek; harvests along 2.6 miles of stream; no roads or stream crossings; harvests 3% of Frank Creek; low risk to fish; no impact to wetlands; no greater human access provided.	Construct and operate 1 LTF for 1-2 years. Second least amount of impact of action alts.	Uses West Face LTF to water and dewater 11.6 MMBF. West Face meets most ATTF guidelines.

Table 2-15, Alternative-Issue Comparison Chart

Alternative	Issue Four-Species Conservation	Issue Five-Goats	Issue Six- Brown Bears
Alternative A	No effects on species conservation variables.	No effect on present amount and quality of goat habitat and movements.	No effects on present amount of habitat or potential for harvest.
Alternative B	Least effect of action Alts to indicator species; fragments old growth blocks and corridors the least; increases access into Frank Creek.	Least effects on habitat values of action Alts; retains 98% of habitat capability; little effect on vertical corridors; harvests 1% of VCU high value habitat.	Retains 98% of original habitat capability with intermediate effects on access due to increased access up Frank Creek.
Alternative D	Intermediate effects to indicator species; intermediate effects to old growth blocks; fragments west face corridor but does not increase human access over time.	Retains 95% of habitat capability; some barriers to vertical migration; Harvests 12% of VCU high value habitat.	Retains 99% of original habitat capability with no long-term effects on access.
Alternative E	Greatest effects to indicator species; maximum fragmentation of old growth; maximum human access.	Retains 93% of habitat capability; some barriers to vertical migration; Harvests 13% of VCU high value habitat.	Retains least (96%) of habitat capability; much greater impact from increased access due to road up Tom Creek.
Alternative F	Second greatest effects to indicator species; second ranking in maximizing fragmentation; increased access up Frank Creek.	Retains 94% of habitat capability; some barriers to vertical migration; Harvests 13% of VCU high value habitat.	Retains 97% of habitat capability; increased access up Frank Creek.
Alternative G	Third greatest effects on indicator species; similar effects to fragmentation as B but slightly greater; increased access up Frank Creek.	Retains 94% of habitat capability; few barriers to vertical migration; Harvests 5% of VCU high value habitat.	Retains 98% of habitat capability; increased access up Frank Creek.
Alternative P	Intermediate effects to indicator species; Intermediate effect to old growth blocks; fragments west face corridor but does not increase human access.	Retains 95% of habitat capability; retains large block of high value habitat on west face; fewer barriers to vertical migration; Harvests 9% of VCU high value habitat.	Retains 98% of habitat capability with no long term effects on access.

Table 2-15, Alternative-Issue Comparison Chart

Alternative	Issue Seven- Soil Productivity	Issue Eight-Social Values	Issue Nine- Logging Camp	Issue Ten- Economics
Alternative A	No effect on soil productivity	No effects on present values; no natural appearing landscapes; no impact on outfitting and guiding from harvest; primitive & semi-primitive experiences provided.	No camp.	Outfitting and guiding values may benefit. Harvest postponed until economics or technology improves.
Alternative B	Low risk of disturbance to soil; some lands out of production; 11 acres harvest on high hazard soil.	Least change in existing areas among action alts; increased recreation access up Frank Creek; Retains existing recreation values up Tom's; no effects on cultural resources or subsistence; least visual effects and risk; harvest not noticeable; most outfitter and guide potential maintained.	Duration and extent of recreation displacement is least of all action Alts; Tom Creek recreation should be unaffected; some opportunity for harvest of fish and wildlife up Frank Creek watershed; duration most limited.	Below cost at mid-market levels.
Alternative D	Low risk of disturbing soil; fewest lands out of production of all action Alts.; 52 acres harvest on high hazard soil.	Least change in present access pattern; most potential changes occur to Bradfield Canal; retains existing recreation values up Tom's; 68 acres in high probability cultural area; harvest should not be noticeable but high risk to visual resource.	Duration and extent of recreation displacement is slightly more than Alt. B. Least amount of opportunity for harvest of fish and wildlife; duration is slightly more than B.	Greatest positive return.

Table 2-15, Alternative-Issue Comparison Chart (continued)

Alternative	Issue Seven- Soil Productivity	Issue Eight-Social Values	Issue Nine- Logging Camp	Issue Ten- Economics
Alternative E	Some risk of disturbance due to cable logging; most lands out of production; 89 acres harvest on high hazard soil; some road segments in high hazard terrain.	Most change in access and in views up Bradfield and Tom; increased access; no effects to cultural resources or subsistence; harvest should not be noticeable from Bradfield but high risk. Outfitters may loose up to half their potential use under worst-case scenario.	Duration and extent of recreation displacement is greatest; most opportunity for harvest of fish and wildlife and greatest risk to bear, and fish populations; duration is the greatest.	Most negative return below cost at mid-market levels.
Alternative F	Low risk to soil disturbance; some lands out of production; 75 acres harvest on high hazard soil.	Changes to Bradfield and Frank Creek landscape; increased recreation access up Frank Creek; retains existing recreation values in Tom's; no affect to cultural or subsistence resources; combines visual effects of Alts B and D.	Duration and extent of recreation displacement is intermediate; recreation up Tom Creek should be unaffected; opportunity to harvest fish and wildlife up Frank Creek; duration is greater than Alt. B & D but less than Alt. E.	Positive economic return.
Alternative G	Low risk to soil disturbance but some risk of blowdown; some lands out of production; 46 acres harvest on high hazard soil.	Changes to Bradfield will not be noticed; retains existing recreation values up Tom's; no effect on cultural or subsistence resources; visual effects similar to Alt. B; retains most of values for outfitter and guides.	Similar effects to recreation, fish and wildlife as Alternative F.	Second most negative return below cost at mid-market levels.

Table 2-15, Alternative-Issue Comparison Chart (continued)

Alternative	Issue Seven- Soil Productivity	Issue Eight-Social Values	Issue Nine- Logging Camp	Issue Ten- Economics
Alternative P	Low risk of disturbing soil; fewest acres out of production; 81 acres harvest on high hazard soil.	Changes to Bradfield and Frank Creek landscape; human access pattern remains the same; retains existing recreation and outfitting values in Tom's; no cultural or subsistence resources affected; visual affects are less than F and D.	Similar impacts to Alternative D. Displacement for 1-2 seasons.	Positive economic return.

Forest Service Preferred Alternative

In the Draft Environmental Impact Statement, Alternative F was tentatively identified as the preferred alternative. Based on public comment and review of the DEIS, Alternative P was created.

Table 2-16, Changes to Roads and Units Between DEIS and FEIS

Unit#	Reason	Comments
3	S/W/V	Unit was broken to eliminate an old slide area creating a natural wildlife corridor and address visual concerns near beach fringe protection. This created units 3-1 and 3-2.
4	S	10 acres reduction due to ground verified boundary location responding to steep slope hazard soils present in unit.
5	V	4 acres reduction reflecting visual concern on prominent water facing slope.
6	F,L	Southwest boundary acre increase due to distant reduction of Class I stream. Boundary is located 100 feet from Class I stream.
7	L	7 acres increase to reflect ground verified suitable boundary location.
9	S	12 acres reduction due to ground verified boundary location responding to steep slope hazard soils present in unit and installation of adequate Class I protection on Frank Cr.
10	S	9 acres increase responding to soil concerns regarding concern for wind firm stability of proposed leave tree sites.
11	L,S	Unit was dropped to minimize impacts to soils.
12	L	10 acres increase to reflect additional suitable harvest area.
13	L,S	Unit was dropped to minimize impacts to soils. Steep cliffs and poor helicopter drop off locations created difficult accessibility for timber harvest operations.
15	L	8 acres increase to reflect additional suitable harvest area.

2 Alternatives

**Table 2-16, Changes to Roads and Units Between DEIS and FEIS
(continued)**

Unit#	Reason	Comments
16	S	10 acres reduction responding to steep slope high hazard soils present in unit.
18	S	13 acres reduction responding to steep slope high hazard soils present in unit.
20	F	Unit was broken to provide adequate class I and II stream protection creating units 20-1 and 20-2.
Frank Creek Road	N/C	No change.
Tom Creek Road	N/C	No change.

Resource Issues:

F=Fish/Hydrology
W=Wildlife
L=Logging Systems
V=Visual
S=Soils

Chapter 3

Affected Environment

Chapter 3

Affected Environment

Introduction

In this chapter we describe the environment that will potentially be modified by this project. We feel that the information in this section is not only important documentation for this potential harvest entry but future management activities as well. As the environment is modified from its existing condition it is important for us to understand and document the baseline condition. This chapter is divided into two main sections:

Watershed Characteristics- In this section we describe the key components of the ecosystem and the general characteristics of VCU 510.

Ecological Zones- We describe the environment further in terms of six ecological zones in order to illustrate the relationship between the ecosystem components described in the previous section. The ecological zones also help make the tie between the ecosystem being described and the planning issues.

Watershed Characteristics

We describe the ecology of the area by beginning our discussion with the corner stones of the Southeast Alaska landscape- geology, soil and water. Building on these three basic components, we go on to describe the fish, vegetation, wildlife and finally the past and present people that depend on these elements of the ecosystem.

The Corner Stones: Geology, Soil and Water

The Campbell study area has bedrock material which is different than that occurring around it on the mainland. Folded, metamorphic rock gives the area a steep, broken terrain and orientation. In addition, glacial lakes of long ago likely formed the unique and deep sand deposits found in the valleys. Streams further divide and dissect this landscape. The geology, soil and water patterns in turn lead to a heterogeneous, matrix of vegetation and habitats for wildlife and people.

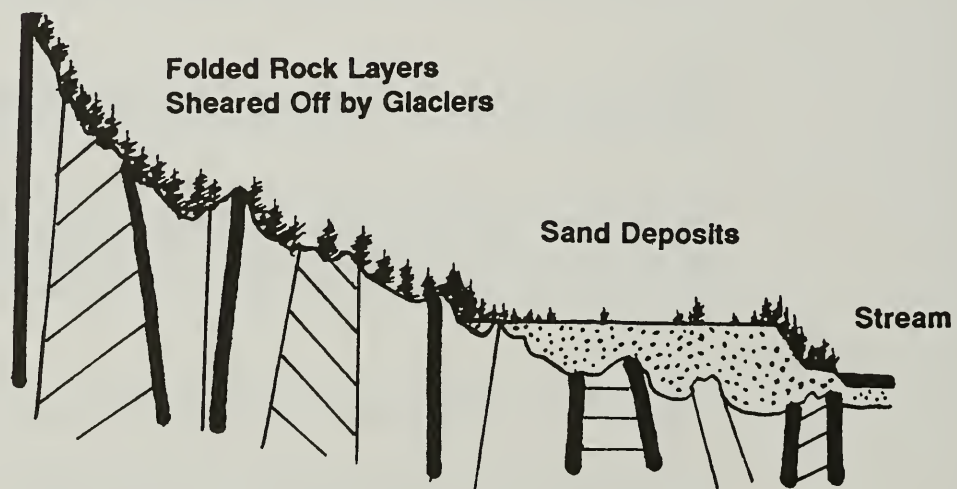
Geology and Soil

Vertically folded rock gives the area its broken terrain & NW-SE orientation

The Campbell study area is within a belt of highly metamorphosed rocks, predominately gneiss and schists, that lie in a northwest-southeast direction. This metamorphism lies adjacent to igneous rocks (also referred to as plutons and batholiths) predominantly quartz-diorite, diorite, and granite, which occur on either side of the study area: in the Martin Creek watershed to the west, and in the Kapho mountains on the east side of the Harding River.

The structure and distinct foliation of this metamorphic bedrock has a strong influence on the appearance and management suitability of this landscape. The landforms developed in this material are very irregular and broken mountain slopes with a corresponding pattern of soil types and plant communities. The nearly vertical orientation of the bedrock produces a complex of soil types reflecting drastic differences in soil depth, composition and steepness within short distances. Figure 3-1 illustrates some of the important terrain formation factors in the study area; folded metamorphic rock which was sheared off by glaciers and deep sediments of sand formed by glacial lakes which were later carved into by streams.

Figure 3-1, Terrain Formation Illustration



Soils vary widely in type and depth.

This soil landscape pattern typically consists of very shallow soils on short steep escarpments near vertical cliffs. Deeper soils have developed in colluvial material on moderately steep concave slope positions or by weathering from bedrock. A few soils have developed in the scattered remnants of glacial till material plastered against the valley sidewall. Both Tom and Frank Creek valleys have a U-shaped profile characteristic of glacially carved valleys. Valley bottoms are relatively flat with valley sidewalls of steep forested slopes rising abruptly from the valley floor to the extensive areas of rounded, glacially scoured alpine.

The glacial valleys are filled with deep sand deposits.

The lower valley of both Tom and Frank Creeks are filled with glacio-fluvial deposits, mostly stratified sand and silt (See Figure 3-2). The location, extent, and horizontal stratification of this material suggests that it was formed in-place by sedimentation of a glacial lake to an elevation of about 280 feet above present sea level. The glacial lake was likely formed by glacial ice and debris in the Bradfield Canal fjord impounding melt waters from the uplands in the Tom and Frank Creek watersheds. This theory is supported in part by the deposits of glacial marine till at the mouths of Frank and Tom Creeks. Source of this sediment is thought to be from the rapid erosion of fresh glacial deposits immediately after or during the process of deglaciation of these upland valleys about 8000 years ago. As the remaining glacier retreated up the Bradfield Canal these glacial lakes drained and Tom's Creek quickly and easily cut into the soft sandy sediments. This left high, steep banks which are still a source of sandy sediment in Tom Creek.

Figure 3-2, Likely Extent of Glacial Lakes Responsible for Sand and Silt Deposits



Sand deposits are highly erosive.

This type of soil material presents a challenge to management since it is highly erosive if the protective vegetation is removed. Cutbanks are highly unstable and subject to erosion unless mitigative measures are applied.

3 Affected Environment

Timber harvest affects soil temperature and productivity.

Soil development in the Campbell Study Area is strongly influenced by high precipitation and cold soil temperatures. Under these conditions, organic matter decomposes slowly and tends to accumulate on site. Tree rooting is generally very shallow, even on deep soils. Roots are generally present in the surface organic layers and the upper few inches of mineral soil. Typically this rooting zone is never dry, is very acid, and contains most of the nutrients available for plant growth. Soil productivity and nutrients can be affected by timber management. Removing the canopy of trees allows increased solar radiation to penetrate and warm the soil. Increased soil temperature accelerates microbial activity and nutrient cycling, thus increasing the availability and use of soil nutrients, particularly nitrogen, by vegetation. The result is an abundance of rapidly growing forbs, shrubs, and tree seedlings. Consequently, the net annual biomass production is greater than it was in the old growth forest. This effect is relatively short lived and tends to diminish as the young forest stand closes canopy and again shades the soil surface.

The upper, soil layers are important to productivity.

Since most of the soil nutrients are in the upper organic-rich layers, destruction or removal of these surface layers will have a severe adverse effect on tree growth. This can occur by landslides, surface erosion, severe burning, yarding disturbance, or by displacement by roads, skid trails, landings, or rock pits. Also, soil damage can occur by compaction or puddling, which prevents soils from draining, decreases the rooting depth, and thus reduces productivity. The allowable limits of these kinds of soil disturbance are described in the Region 10 Soil Quality Standards (FSM 2554 R-10 Supplement 2500-92-1, 1/15/92).

Most undisturbed soils on Campbell Study Area are very resistant to surface erosion. Thick layers of surface organic matter and surface mats of vegetation act as protective covers that minimize surface erosion. Most soils are subject to erosion however, if the protective surface layers are removed. This is especially true of the glacial sediments in the lower valleys. These materials, when disturbed by landslides or undercut by streams, often become chronic sources of sediment.

In the natural setting, soil mass movement is the dominant erosional process. Most landslides occur during, or immediately after, periods of heavy rainfall when soils are saturated. Soils that are prone to landslides are typically on steep slopes and have distinct slip-planes such as compacted glacial till or bedrock sloping parallel to the surface. When subjected to heavy rainfall, these areas have a high likelihood of mass movement, especially if disturbed by blasting of rock pits or road pioneering, side casting of excavated material, or logging practices that cause substantial surface disturbance.

Tree roots stabilize slopes.

Recent research on landslides in Southeast Alaska (Swanston 1989) has concluded that although over 90 percent of all landslides in the past 20 years were not directly caused by logging or roads, logging and roads do increase the potential for landslides in a given site. Vegetation, tree roots in particular, have a stabilizing effect on slopes. Strength of tree roots tend to decrease significantly four to seven years after the tree is cut. This decrease in soil holding capability results in an increased likelihood of soil movement on steep slopes following clearcutting. Further, the displaced roots of uprooted trees can disturb the soil mantle whenever windthrow occurs. Under natural conditions, windthrow is an important triggering device of debris avalanches and flows in Southeast Alaska.

The broken terrain makes landslides uncommon.

In the natural setting, large landslides are uncommon in the Campbell study area. This is due in part to the broken uneven terrain with relatively stable soil materials on upper slopes. Recent landslides on upper mountainslopes tend to be infrequent and of small size. Areas with frequent landslide scars are generally associated with the glacial material on the lower valley sideslopes and along the incised stream systems. A planning level stability analysis of the study area was done based on the Soil Resource Inventory of the Stikine Area.

There is a high percentage of high hazard soils in the study area.

Landslide hazard classes are used to group soil map units that have similar properties regarding the stability of natural slopes. Three classes; high, moderate, and low; rank soil units according to their relative potential for mass wasting (Table 3-1). The relatively high proportion of high hazard soils, (35% of the study area), is typical of steep mainland landscapes. Figure 3-3 shows the location of high hazard soils in the southern portion of the study area.

Table 3-1, Distribution of Soil Hazard Classes in the Campbell Study Area

Soil Hazard Class	Acres	Percent
Low	4,910	18%
Moderate	12,834	46%
High	9,956	36%

FIG. 3-3, SOIL HAZARD CLASSES



Water

The Campbell analysis area includes 17 watersheds whose streams terminate at saltwater, creating a total watershed analysis area of 27,700 acres with 104 miles of inventoried streams. Table 3-2 below illustrates some of the characteristics of a few of the watersheds in the Campbell analysis area.

Table 3-2, Brief Descriptions of Some Analysis Area Watersheds.

Watershed Name or Description	Area in Acres (sq.miles)	Total Stream Length (miles)	Drainage Density (mi./sq.mi.)
Tom Creek	19,065 (29.8)	72.7	2.44
Frank Creek	3,290 (5.14)	10.0	1.95
Smallest Watershed	51 (0.08)	0.41	5.21
Largest Watershed	19,065 (29.8)	72.7	2.44
Smallest Drainage Density	329 (0.52)	0.45	0.88
Largest Drainage Density	56 (0.09)	0.51	5.85

Tom Creek is the largest watershed.

Notable watersheds in the study area include Tom and Frank Creeks. Tom Creek, makes up about three-quarters of the study area and drains the entire northern portion of the VCU. Two lakes, Tom Lake and Campbell Lake are drained by Tom Creek. Frank Creek drains a watershed 6 times smaller than the Tom Creek drainage, but is the only other gradual sloping stream channel. Another 1,005 acre watershed (A24A) contains two steep, V-notch channels which meet on an alluvial fan just above saltwater. The fan itself is in stable condition, with advanced soil development processes occurring. All other study area watersheds are less than about 300 acres in size (See Figure 3-4).

Drainage densities are high, especially on the West Face.

Drainage densities in Table 3-2 are determined from the Stikine Area channel type inventory and corresponding GIS database. Drainage density is a measure of the total inventoried stream length in a basin divided by the basin area. Higher drainage densities indicate a watershed is more "dissected" than another, and therefore the risk that erosion processes will deliver sediment to a stream channel is greater. On the Stikine Area, drainage densities range from less than one to greater than 10 miles per sq. mile, with a median value of 2.8. The Campbell watersheds have a median drainage density of 3.50 indicating that the Campbell study area is more dissected than the median Stikine Area watershed. The small, steep watersheds along the Bradfield Canal have higher drainage densities and are responsible for this high value.

FIG. 3-4, WATERSHED BOUNDARIES AND STREAMS



Peak flows occur twice a year in the spring and fall.

These drainages receive a range of annual precipitation from 100 to 120 inches. Approximately 63 percent falls between September and February. Runoff processes in the Tom Creek watershed produce average annual discharges on the order of 11.5 cubic feet per second (cfs) per square mile. Two-year peak flows of 111 cfs per square mile may occur, usually associated with intense October storms, or early spring rain-on-snow events. Summer low flows of 0.36 cfs per square mile are possible, but are not considered potential impediments to fish passage and spawning success. Stream temperatures likely remain within anadromous fish limits year-round.

The Building Blocks: Fish, Vegetation and Wildlife

The living parts of the ecosystem respond to the non-living processes and result in the plant and animal communities we see. Fish depend on factors which are dictated by geology, soil and water processes such as; access, composition of the stream bottom, nutrients, vegetation and structure. Important aspects of the plant communities include species composition, age, and structure. Southeast Alaska is dominated by a temperate rainforest composed primarily of Sitka spruce and western hemlock. On a local scale plant associations are affected by soil type, drainage, topography, and disturbance. Between glacial events the forest developed into an old growth state where small scale windthrow is the most common disturbance. These small disturbances create important horizontal and vertical layers of vegetation (structural diversity) in old growth forests. These include small scale patches of various ages and sizes of trees, variable tree density within the forest stand, and a multi-storied canopy. This structure allows enough light to reach the forest floor so that understory production is high, while intercepting sufficient snow to make that food available to herbivores (eg., deer, goats) in winter.

Fish

Waterbodies of the study area that have the most habitat and produce most of the fish are Tom and Frank Creeks. There are six other unnamed streams which have small populations of fish. Because these streams vary in both the amount and quality of the habitat, they produce varying numbers and species of fish (See Table 3-3). These streams are shown in Figure 3-18, later in this Chapter.

Tom Creek spawning habitat is best just above and below the lake.

Tom Creek and Lake- Tom Creek is the largest stream in the study area. It has the most fish species, produces the most fish, and has the most sportfishing use. Tom Creek is a fourth-order Class I stream containing good to excellent habitat over most of its length. Habitat is utilized by all five species of salmon and steelhead. The lower two miles of the stream flow through deep deposits of silt and sand. Erosion of these deposits has resulted in tightly compacted streambed gravels. Fish have been observed digging redds in this heavily embedded reach, but egg-to-fry survival is not believed to be good. Although limited, excellent spawning areas exist in the floodplain reaches immediately above and below Tom Lake. These accessible gravels are loosely compacted and generally two to six inches in size. These spawning areas may seed the rest of the accessible system.

Table 3-3, ADF&G Numbered Fish Streams

Stream Number	Stream Name	Major Species & Escapement Average/Peak	Other Species	Habitat Quality	Special Considerations
107-40-10470	Tom Lake Creek	Pink 10,500/52,600 Chum 1,300/9,600 Coho (No record) Sockeye 50/500 Chinook 10/100	Steelhead Cutthroat Dolly Varden	excell. spawning good rearing	spawning habitat limited embedded gravels lower 2/3 2 lakes in system sideslopes of silt/sand in lower 2/3 long intertidal zone low gradient
107-40-10400	Frank's Creek	Pink 4,000/26,00 Chum 130/2,000 Coho (No record)	Steelhead Cutthroat Dolly Varden	very good spawning good rearing	banks of clay, silt, & sand along lower reach
107-40-10390	unnamed	Coho (No record)	Cutthroat	Poor spawning poor rearing	short reach-(300 ft) large substrate(steep radiant)
BC-9	unnamed	Coho (No record)	Cutthroat Dolly Varden Pink	fair spawning fair rearing	banks and bottom of clay silt, sand thru-out length
107-40-10450	unnamed	Coho (No record) Pink 800/1,500 Chum 4/20	Dolly Varden	poor spawning poor rearing	short, steep gradient large substrate
BC-10	unnamed	Chum (No record)	Coho Dolly Varden	poor spawning fair rearing	embedded gravels sideslopes of sand/silt
BC-11	unnamed	Coho (No record)	Pink Cutthroat	good spawning fair rearing	large substrate silt/sand banks in lower reach
BC-12	unnamed		Cutthroat	poor spawning good rearing	large substrate short reach

Tom Creek rearing habitat is good.

Rearing habitat is fair to good from Tom Lake downstream. Abundant aquatic vegetation provides good cover for juvenile salmonids. The number of instream logs is low, probably due to channel width associated with fourth-order streams or to the regulating effect of Campbell and Tom Lakes. Most of the large wood in the lower 2/3 of the stream is concentrated in one log jam located at a bedrock constriction near tidewater. This single concentration of large wood may be due to the power of ice flows occurring with rain-on-snow events. The slack waters of Tom Lake absorb sunlight, creating water temperatures that are close to optimal for salmonid growth. Potential coho rearing capacity of the lake was enhanced in the mid-1980's by felling trees in the lake at selected points along its shore.

Tom Lake is fed almost entirely by Campbell Creek, a third-order stream. Nutrients exported from Campbell Lake enhance the productivity of the lower Tom system. Upstream migration above Tom Lake is stopped by a 75-foot barrier falls below Campbell Lake. Access to upper Tom Creek is blocked by a series of 6-to-15-foot falls.

Frank Creek spawning and rearing habitat is good.

Frank Creek- Frank Creek is a third-order Class I stream containing good fish habitat, supporting steelhead and all North American salmon species except chinook. Spawning habitat is well distributed throughout its length. Spawning gravels are moderately compacted and generally one to six inches in size. Rearing habitat ranges from fair to very good over the stream length. Beaver activity enhances rearing capacity via nutrient cycling and the creation of cover. Channel stability ranges from fair to good over most of its length. The lowermost mile is bordered by hillslopes comprised of fine-textured deposits. Deposits of blue clay are exposed near tidewater. Riparian vegetation is the major factor contributing to channel stability and habitat formation, especially in the upper Class I reach.

Other streams in the area have limited fish habitat.

107-40-10390. This unnamed, second-order stream is located west of Frank Creek, near the westerly edge of the study area, adjacent to an abandoned prospector's campsite. Over time, the bedload of two high gradient tributaries has formed an alluvial fan of coarse sediments through which this stream cuts. Small populations of coho and pink salmon, cutthroat trout, and Dolly Varden char use the limited habitat.

BC-9. Located just east of Frank Creek, this unnamed Class I stream drains steep forested slopes to the east and a narrow band of muskeg to the west. This second-order stream is less than ten feet wide throughout its length. Limited habitat quantity and fair habitat quality combine to create a low fish production potential. Fine-textured deposits contribute to low productivity and present a risk to water quality.

107-40-10450. Located between creeks BC-9 and BC-10, this unnamed second-order stream drains a small bowl-shaped watershed known locally as "hollywood bowl." The lower 1000 feet is Class I but production potential is low due to steep gradient and large substrate. Fine-textured deposits present a risk to water quality, but this risk is reduced by steep gradient.

BC-10. Located just west of Tom Creek, this unnamed second-order Class I stream drains rocky, forested slopes to the west, and extensive muskeg over deep, fine-textured deposits to the east. Gravels are heavily embedded with sand and silt eroded from surrounding slopes. Production potential is very low due to the small size of the stream and the natural fine sediment load.

3 Affected Environment

BC-11. Located just east of Tom Creek, this second-order Class I stream drains a small lake. Along a short section near saltwater, streambanks are comprised of fine-textured deposits. Nearer the lake, the stream drains muskeg. Coho are known to inhabit the stream, but it is only assumed that the lake habitat is used for rearing. The outlet stream provides the only known available spawning area. Production potential is low due to the small size of the stream and the limited amount and variety of littoral vegetation along the lake shore.

BC-12. This first-order Class II stream is located just east of BC-11. It drains mostly muskeg, possesses large substrate, and has an extremely low production potential.

There are no T&E fish species inhabiting the area.

Threatened and Endangered Species- There are no fish species inhabiting the study area which are listed, or proposed for listing, as threatened, endangered, or sensitive by the National Marine Fisheries Service pursuant to the Endangered Species Act. However, the Alaska Department of Fish and Game, Sport Fish Division has identified low returns of steelhead trout in streams adjacent the study area in the Bradfield Canal (Anan and Marten Creeks, Harding and Eagle Rivers) and has implemented a catch-and-release/unbaited, artificial lure with barbless hooks emergency regulation as a protection strategy. ADFG-Sport Fish Division has also identified reduced populations of cutthroat trout in streams Southeast region-wide and is currently considering a catch-and-release/unbaited, artificial lure with barbless hooks management strategy for this species.

Vegetation

The vegetation in the Campbell study area, like much of southeastern Alaska is a result of the cool climate and large amount of precipitation. Forested plant communities have overstory trees dominated by western hemlock and Sitka spruce, with lesser amounts of mountain hemlock, Alaska yellow-cedar and western redcedar. Shore pine, and red alder are also present in some habitats. The shrub species include blueberry, rusty menziesia, salmonberry, red huckleberry, alder, and devil's club. Forbs include five-leaf bramble, bunchberry, rosey and clasping twisted-stalk, fern-leaf goldthread, bluebeard, heart-leaf twayblade, trifoliate foamflower, and skunk cabbage. Also found are a variety of mosses, lichens, liverworts, and ferns, and a few sedges and grasses. Non-forest communities in the study area occupy muskegs, alpine meadows, estuaries, and riparian and snow avalanche brush communities. Table 3-4 shows the percentages of the major plant communities or associations in the study area. Figure 3-5 shows the location of these associations within the study area.

All plant communities in the study area, with the exception of several scattered even-age stands generated by past blowdown events, are presently in a climax stage, and represent the potential natural vegetation for the site. Other forms of disturbance affecting the vegetation in the area are snow, insects, diseases, ice, flooding, landslides and snow slides.

Table 3-4, Percentage of Plant Associations in the Study Area

Plant Community	% of Study Area
Western Hemlock Plant Associations	25%
Western Hemlock-Alaska yellow cedar Plant Associations	4%
Sitka Spruce Plant Associations	2%
Mixed-Conifer Plant Associations	2%
Mountain Hemlock Plant Associations	8%
Alpine Communities	26%
Alpine/Lichen/Rock	8%
Alpine Meadow	<1%
Alpine Complex	5%
Alder/Shrub Snow Avalanche slopes	8%
Riparian Brush Communities	1%
Muskeg emergent peat/sphagnum	9%
Muskeg tall sedge	<1%
Non vegetated	<1%
Estuarine (Intertidal Sedge/Forb Communities)	<1%

Hemlock trees and blueberry shrubs dominate the study area.

Western Hemlock Associations- In this association western hemlock is the dominant overstory species. Sitka spruce is an important component but rarely is as abundant as western hemlock. Mountain hemlock, Alaska yellow-cedar, shore pine and western redcedar are not present or represent only a very minor component. Western hemlock is also a major understory tree species. Productivity ranges from moderate to high and natural regeneration (young trees) is prolific. Most stands are multi-storied and have a high ability to intercept snow. The shrubs are usually dominated by blueberry and rusty menziesia. The presence of devil's club indicates some type of soil disturbance on some sites. Common forbs found in these plant associations include five-leaf bramble, bunchberry, rosey twisted-stalk, and fern-leaf gold thread. Presence of skunk cabbage in some communities indicates wet soil conditions.

The western hemlock associations are numerous in Frank Creek and form a large contiguous area. In Tom Creek the majority of the hemlock associations are on the west side of the watershed and at the head waters of Tom Creek. There is generally more Sitka spruce in the forests of Frank Creek than in Tom Creek.

3 Affected Environment

There is not much cedar in the study area.

Western Hemlock-Alaska Cedar Associations- Both Alaska cedar and western hemlock are in the overstory of this association. Usually western hemlock is more abundant but Alaska cedar is always present. Western hemlock generally dominates the understory trees. This plant association is most common at higher elevations, just below the sub alpine zone. There are tall blueberry shrubs with lesser amounts of rusty menziesia and red huckleberry. Common forbs include bunchberry, fern-leaf goldthread, and five-leaf bramble. Other forbs that may occur include rosey and clasping twisted-stalk, foamflower, and heart-leaf twayblade. The presence of abundant skunk cabbage on some sites indicates wet soil conditions. These associations are moderately productive. Natural regeneration is primarily western hemlock with some Sitka spruce. Alaska cedar regeneration is uncommon. A multi-storied canopy provides moderate snow interception. Production of blueberry forage and persistent forbs is moderate. Snags are common in this plant association and tend to persist for many years due to the rot resistant properties of Alaska cedar.

Spruce stands are found along streams and on floodplains.

Sitka Spruce Associations- Sitka spruce plant associations are highly productive and usually found on sites with re-occurring soil disturbance. Sitka spruce is the dominant tree species and western hemlock can be co-dominant. Sitka spruce stands are primarily found on flood plains and alluvial fans where soils are periodically disturbed by flooding. If Sitka spruce is the climax plant community then the disturbance is naturally occurring and usually frequent for Sitka spruce to dominate the site. On sites with a less frequent disturbance, western hemlock will eventually replace the less shade tolerant spruce. Understory trees are dominated by western hemlock with lesser amounts of Sitka spruce. Shrubs include blueberry, rusty menziesia, but devils's club and salmonberry dominate in some associations. Skunk cabbage indicates wet soils on some sites. Other forbs include bunchberry, rosey and clasping twisted-stalk, fern-leave goldthread, five-leaf bramble, and trifoliate foamflower. Multi-storied stands have a high snow interception capability. Blueberry is usually present at low levels and forb production is moderate to high. Natural regeneration is mainly hemlock and Sitka spruce.

In the Campbell Study area the Sitka spruce communities are concentrated along streams and are the result of frequent flooding. Tom Creek drainage has a larger percentage of the spruce plant associations than Franks Creek.

The Mixed Conifer Series is common in Tom Creek.

Mixed Conifer Associations- These areas are generally composed of scrub forests. These plant associations are found on sites that are poor and have a mix of conifer species, including western hemlock, mountain hemlock, Alaska cedar, western redcedar, Sitka spruce, and in some cases shorepine. No conifer species is dominant. These associations usually occur on wet, poorly drained sites but can occur on shallow well drained soils. Rusty menziesia and blueberry make up a tall dense shrub layer. Forbs present include bunchberry, five-leaf bramble and fern-leaf goldthread. Skunk cabbage, rosey twisted-stalk, heart-leaf twayblade, deer cabbage, twinflower and bluebead may also be present. Some plant associations in this series are not considered capable of producing commercial wood products. Natural regeneration of spruce and hemlock is common on these associations. Growth is slow. This association can be important to wildlife because blueberry forage and the production of persistent forbs is high. Snow interception is low making forage unavailable to wildlife during the winter.

Within the study area, the mixed conifer plant association is usually found on very wet sites around muskegs. Mixed conifer and muskeg communities are very common in the Tom Creek drainage.

There are some unique plant communities in the area.

Other Plant Communities- Although there are no Threatened and endangered plant species known to exist in the Campbell study area there are some plant communities which are unusual or limited. The plant species *Calamagrostis crassiglumi* (a wet, marshy area grass) and *Carex lenticularis* var. *dolia* (an alpine species) are plant species being considered for protection under the Endangered Species Act which may be present in the study area according to the Fish and Wildlife Service.

Western redcedar is limited to the immediate beach fringe area below elevations of 200 feet. Redcedar is not found farther up the Frank or Tom Creek valleys. This is thought to be one of the northernmost extents of this species on the mainland. Estuarine sedge/forb communities are very limited in the Campbell study area. These communities although small, are quite important to wildlife. A riparian freshwater meadow, of approximately 130 acres, is a prominent vegetative feature on Tom Creek just downstream from Tom Lake. Freshwater meadows are not common anywhere on the Forest and this is the only community of this type on the study area.

A rather unusual community dominated by dense thickets of Oregon crab apple (*Malus diversifolia*) are found in the Tom Creek watershed. These are small communities of only 2 or 3 acres in size on steep rocky slopes. Although this species is frequently found in small numbers scattered along the edge of meadows and muskegs, it is very unusual to find it in dense stands on steep upland sites.

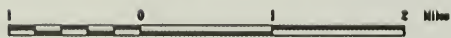
FIG. 3-5, MAJOR PLANT ASSOCIATIONS



Legend

- Hemlock Associations
- Hemlock/Yellow Cedar Associations
- Spruce Associations
- Mixed Conifer Associations
- Mountain Hemlock Associations
- Alpine--Vegetated and Bare Rock
- Brush
- Muskegs and Beach Grass
- Lakes

Map scale 1:100000



Scale is 1 inch = 1.58 miles

Forest Plant Communities and Succession- Plant communities are the result of numerous factors related to climate or soils. Probably the most important factors are temperature extremes, amount and timing of rain and snow, wind, and the depth and drainage conditions of the soils. Other factors influencing plant distribution include aspect, elevation and slope which influence the microclimate and soils factors. Some plant species have very specific requirements while others can grow within a wide range of conditions and are less useful as "indicators" of specific environments. Plant communities are also influenced by competition. The plants that are best able to compete given the site conditions will be the ones to outcompete others for light, water and available nutrients. Conditions are also changing. Generally the smaller the patch size of the plant community the more changes that can occur. Under a dense forest canopy species that can grow in the shade will be favored. As a result of a disturbance such as windthrow additional light will reach the forest floor and trigger the growth of plants.

It takes about 300 years for an old growth forest to develop.

Following a disturbance such as logging, plant species respond depending on the type, amount and timing of the disturbance. Usually forbs, shrubs, and new conifer seedlings become established quickly. The increased sun light reaching the ground warms the soil and helps make more nutrients available to the growing plants. As the plants grow, competition increases for the available light and nutrients. In 15 to 30 years the lower branches of the trees begin to touch and the number of forbs and shrubs decrease because of shading. Competition between the trees also occurs. The more vigorous trees will continue to grow and increase the shading of overtopped trees. The overtopped trees will begin to slow their growth or die. As the trees get older more trees die off and some openings in the canopy can occur, letting light reach the forest floor. This light will re-stimulate shrubs, forbs, and seedling germination and growth. Usually an understory of forbs and shrubs will begin to develop about 100-150 years after the stand originated. The trees continue to compete with each other. Insects, and diseases also become a factor and additional openings will occur. As more light reaches the floor a second or third story of young trees will begin to develop. After about 200 years the trees will be of different heights and sizes. There should be a forb and shrub understory with most or all of the species that were present before the disturbance. By age 300 years, the stand can resemble the original old growth condition on most sites.

Disturbance plays an important role in the forest.

Natural causes of disturbance are disease, animals, insects, wind, root rots, and sometimes landslides and avalanches. These factors can perpetuate and play a role in developing old growth conditions or in regenerating areas but their levels can be influenced by the environment and management. Dwarf mistletoe is present on the site and affects mainly hemlock. Insect populations are normally kept in check by the cool moist climate but outbreaks of several species have occurred in southeast Alaska in the last 100 years. Animals often feed on the tops of seedling and porcupines will eat the inner bark, especially near the top of the trees. Yellow cedar is presently declining in southeast Alaska. The cause is unknown but is thought to be related to climatic changes and perhaps changes in soil conditions. Large windthrow or landslide areas do not exist in the study area. Windthrow is a small scale event and can often take place in stands of trees already made susceptible by root rots that weaken the roots and lower boles of trees. Long linear snow avalanche areas are common on the west face of the study area and are dominated by brush species.

3 Affected Environment

Wildlife and Biodiversity

Biodiversity concerns keeping the variety of life and its processes.

Eight species are used as "indicators" of the habitat for other wildlife.

The plant associations vary in their value to different wildlife species. Some wildlife species have specialized habitat requirements (eg., goats) while others are habitat generalists and utilize the variety of plant communities available (eg., bears). Size and inter-connectedness of habitat patches in relation to the size and mobility of particular wildlife species affect the suitability of a given area to a particular species.

Biological diversity- The concept of biological diversity (biodiversity) relates to the maintenance of ecological processes and plant and animal species so that their population numbers can fluctuate but maintain viability through time. The National Forest Management Act directs the Forest Service to provide for diversity of plant and animal communities. Specifically, wildlife habitat is to be managed to maintain viable populations of existing native and desired non-native species. The Tongass Land Management Plan Revision Supplement to the Draft Environmental Impact Statement (TLMP SDEIS) contains a discussion of biodiversity as it relates to southeast Alaska and the Tongass National Forest. At the project level several components of biodiversity can be analyzed, such as species diversity, threatened, endangered and sensitive (TES) species, patch size and shape, fragmentation of habitats, and habitat linkages (corridors) (Williams and Marcot 1991).

Species diversity refers to the number of species present and to the numbers of individuals of each species that are present. This depends on the number of different habitats present and the characteristics of the species (ie., geographical range, home range size, dispersal and population characteristics). Because it is not possible to analyze all of the species that occur on the forest, the Forest Service developed the **Management Indicator Species (MIS)** concept to help evaluate the potential effects of resource management on wildlife. MIS are species whose population changes are believed to indicate the effects of land management activities (USDA Forest Service 1982). MIS are selected to be representative of certain habitat requirements and groups of species, with the intent that by monitoring the MIS the Forest Service will also gain information on other species and the vegetation communities (habitat) for which it is representative. The Forest Service, in cooperation with the Alaska Department of Fish and Game, US Fish and Wildlife Service, and National Marine Fisheries Service analyzed 394 species of mammals, birds, amphibians and reptiles. Of these, 22 species of birds and mammals met the criteria for Management Indicator Species for the Tongass National Forest (Sidle and Suring 1986). From these 22 species, 8 species which best represented the habitat and management issues were chosen to evaluate the potential impacts of the Campbell Timber Sale.

Table 3-5 shows the selection rationale, habitat needs, and the important ecological zones for each of the eight species selected. A literature review of the habitat requirements of these species is included in Appendix B of the TLMP SDEIS.

Table 3-5. Wildlife Management Indicator Species for the Study Area

Species	Selection Rationale/ Habitat Feature/ Primary Zones
bald eagle	High profile species with special habitat needs; forest canopy structure that allows access to large open crowned trees along lakes, streams and ocean shores; Saltwater Influence Zone and Freshwater Influence Zone are important ecological zones.
brown bear	Sensitive to human interaction and identified as a key issue in public scoping; mixture of vegetation types for forage, cover and denning; Saltwater Influence Zone and Freshwater Influence Zone are important ecological zones.
hairy woodpecker	Primary cavity excavator; mature uneven age stands with many snags; Saltwater Influence Zone and uplands are important zones.
mountain goat	High profile species and identified as a key issue in public scoping. Also has special habitat needs; cliffs in old growth forest and near alpine; the Upland Zones and the Alpine/Brush Zone are of importance.
marten	Important furbearer representing upland old growth forest; forests with large snags and downed logs for dens and prey habitat, sensitive to human access; Saltwater Influence Zone and the Upland Zones are important.
river otter	Coastal riparian habitats; > 50% canopy cover, large trees for den sites, steep rocky beaches; Freshwater and Saltwater Influence Zones are key.
Sitka black-tailed deer	Present but not abundant in study area but are an important game and subsistence species and an indicator for: low elevation, multi-canopied forest with forbs and blueberry in understory; Saltwater Influence Zone and Saltwater-Facing Uplands
Vancouver Canada goose	Waterfowl representing freshwater riparian habitats; riparian old growth forest with blueberry and skunk cabbage understory, estuary sedge flats; Saltwater and Freshwater Influence Zones are important.

3 Affected Environment

No "T,E and S" species are known to inhabit the study area.

There are six Category 2 species which may inhabit the study area.

There is one Sensitive species which does use the area.

Old Growth patch size is important to biological diversity.

There are large old growth habitat blocks in and around the study area.

Threatened, Endangered, and Sensitive Species are those species for which there is concern about their continued viability. Endangered and threatened species are covered under the Endangered Species Act (ESA). **Endangered species** are those that are "threatened with extinction throughout all or a significant portion of their range" (ESA, PL 97-304). Endangered species potentially occurring in the project area include the American peregrine falcon (*Falco peregrinus anatum*) and humpback whale (*Megaptera novaeangliae*). Neither of these species reside or breed in the study area but may migrate through. **Threatened species** are "species which are likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (ESA). Threatened species that may occur in or near the study area are the arctic peregrine falcon (*Falco peregrinus tundris*) and the Steller sea lion (*Eumetopias jubatus*). These species also do not breed in the area but may migrate through or be occasional visitors.

Category 2 species are also under the purview of the ESA. Category 2 species are species which US Fish and Wildlife Service is considering listing as endangered or threatened. Category 2 species potentially occurring on the study area include **marbled murrelets** (*Brachyramphus marmoratus*), **northern goshawk** (*Accipiter gentiles*), **harlequin duck** (*Histrionicus histrionicus*) and **spotted frog** (*Rana pretiosa*) plus the plant species *Calamagrostis crassiglumis* and *Carex lenticularis* var. *dolia*. A rare plant survey was conducted in critical areas by a professional botanist in 1993. Neither of these two plants were found at that time.

Sensitive species are those plant and animal species identified by the US Forest Service whose population viability is a concern on National Forests within the region (TLMP SDEIS). These species are the **trumpeter swan** (*Cygnus buccinator*), **Peale's peregrine falcon** (*Falco peregrinus pealei*) and **osprey** (*Pandion haliaetus*). Two to four swans, presumably migrating trumpeter swans, were seen using Tom Creek in the fall by Forest Service and Fish and Wildlife Service personnel. They are also known to winter on the Bradfield River nearby when the river is not iced over (winter survey data, Wrangell Ranger District). However, swans are not known to nest on the study area. Osprey have not been observed on the study area. Peale's peregrine falcons nest in southeast Alaska but there are no known nests in the study area.

Patch size and shape. In the context of biodiversity, patches can be thought of as islands of habitat. The important concepts about patch size and shape are maintenance of forest "interior" and large contiguous habitat blocks. Edges between forest and nonforest environments are essentially a habitat type in and of themselves and often have a different environment and species than the forest interior.

Forested stands of Volume Class 4 and greater were used to define forested old growth areas. The majority of the forest in the study area is presently in one large block that is contiguous with the adjacent watersheds of Martin Creek and the Harding River. The amount and size of interior forest blocks was determined by using the computer to "remove" the forest edge for 300 feet (or approximately 3 tree lengths) from the edge of forested old growth areas. Figure 3-6 and Table 3-6 show that the West Face of the study area provides a connection between the large blocks of contiguous old growth in the Martin Creek and Harding River watersheds. These two watersheds are not scheduled for timber harvest under the Tongass Land Management Plan.

FIG. 3-6, OLD GROWTH BLOCKS IN WAA



Table 3-6, Old Growth Blocks Within the WAA

Without buffer	#Blocks	#Acres	Miles of perimeter
Greater than 1000 acres in size	1	39,856	343.88 miles
Less than 1000 acres in size	26	2,494	58.78 miles

Interior forest w/buffer	#Blocks	#Acres	Miles of perimeter
Greater than 1000 acres in size	2	24,556	200.90 miles
Less than 1000 acres in size	73	4,404	113.64 miles

Fragmentation of old growth blocks can occur with timber harvest.

Fragmentation results as large continuous blocks of habitat are replaced by different vegetation structures or species. Over time the habitat changes from a contiguous block to a matrix of new vegetation with small patches of the old habitat, thus leaving "fragments" of the original habitat. In southeast Alaska this generally means replacing old growth forests with managed forests which preclude achieving the characteristics of old growth forests. Concerns associated with habitat fragmentation include the replacement of suitable habitat with unsuitable habitat, creation of edges, and the creation of barriers to migration and immigration.

Tom Creek habitats are naturally fragmented with Muskegs

There has been no previous harvest in the study area so all current forest fragmentation is a result of natural processes (i.e., patches of muskeg in the forest matrix). Natural fragmentation is most concentrated in the Tom Creek area where abundant, wet muskegs overlie the sand deposits in the valley. Barriers created by fragmentation are specific to a certain species. Barriers may include patches of unsuitable habitat, roads, streams, mountains, and ocean.

There is an important habitat corridor between the Tom Creek and the Harding River.

Habitat linkages (corridors) operate on 2 scales. On a landscape scale they provide for movement of animals between local populations. This allows for genetic exchange and enhances the viability of local populations. It also allows for recolonization of an area where the local population has become extinct. Corridors also provide for seasonal and daily movements. For example they may provide for deer to migrate between low elevation winter range and alpine summer range, or for bears to travel between fish streams and bedding areas. Presently the study area and the surrounding watersheds are in their natural state and travel on a local and landscape level is not restricted. A particularly important travel corridor between the Martin Creek and Harding River drainages is located on the eastern boundary of VCU 510.

The People: Past and Present Values

Although the resources of the area are varied and abundant, the steep and broken terrain of the Bradfield landscape presents a challenge to human access. The study area is typical of the surrounding area with those few areas which have access serving the needs of both present and historic people. Important sites and areas of long-ago residents are the same sites of importance today. These areas represent a continuum of important "human habitats" in the study area because like wildlife, different groups of people have different needs and values for the landscape. In the Campbell landscape these habitats overlap in a consistent pattern. Although some of the social values have changed over time, the areas of importance have remained the same. Figure 3-7 shows and Table 3-7 summarize the "human habitats" of the project area which are discussed in more detail below.

Table 3-7, Human Habitat Descriptions

Division	Area	Potential Change in Setting	Description
A	West Face	High, Visual	Seen from the Anan travel route and Bradfield Canal; seen more than visited due to steep slopes; lower portions are suitable and accessible for timber production; provides key south-facing habitats for goat winter range.
B	West Face	High, Visual	Same as A except only seen from Bradfield Canal.
C	Frank Creek	High, Visual & Access	Estuary accessible to historic and present day people; important area for fishing and opportunistic hunting; Crabbing outside the mouth of the creek; no harvest of timber but contains possible LTF site.
D	Frank Creek	Very High, Visual & Access	Semi-primitive; enclosed interior setting; partially viewed at an angle from the Bradfield Canal; includes a "bowl" which faces directly on the Canal; foot access difficult; potential for roads; limited hunting or fishing are only attraction; greatest potential for timber production while minimizing conflicts with other uses and values.

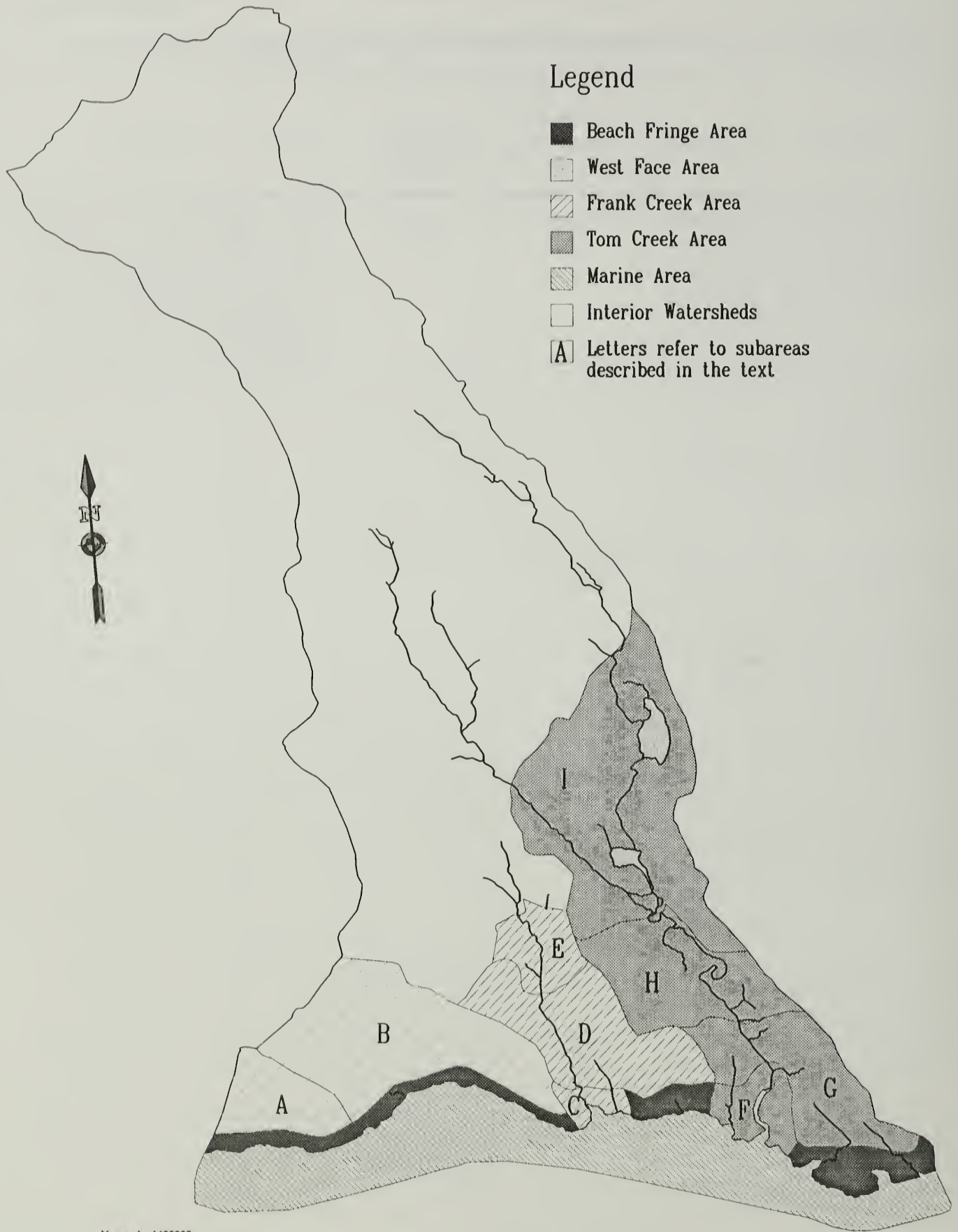
Table 3-7, Human Habitat Descriptions (continued)

Division	Area	Potential Change in Setting	Description
E	Frank Creek	Moderate	Very difficult access due to the need for traveler to cross creeks; unseen to the boater or hiker; just within the range of helicopter access for timber production.
F	Tom Creek	Low	Most important estuary in VCU historically and present day; fishing, crabbing, hunting and viewing wildlife; boat and foot access easy; important to guides; no potential LTF sites or timber production; high wildlife values.
G	Tom Creek	High, Access & Visual	Semi-primitive, non-motorized; access is relatively easy across muskegs on foot; jet boat needed on creek; access to Harding River; some area seen from Harding watershed; potential for roads; limited value for timber production; high scenic values; high wildlife values; bears; important to guides.
H	Tom Creek	High, Access & Visual	Same as G except more primitive and no access or views of Harding River watershed; potential road access for timber harvest terminates in this division; access by foot is more difficult.
I	Tom Creek	Low	Only division having high recreation and scenic values which is not accessible to timber production; 2 lakes; fishing and hunting; high quality scenery; very difficult access; primitive.
Wild	Interior Watersheds	Low	Extremely difficult access; very primitive, wild area; steep terrain; glaciers in the far north of the VCU.

Table 3-7, Human Habitat Descriptions (continued)

Division	Area	Potential Change in Setting	Description
(none)	Beach	Low	Historically important; accessible; high wildlife values; semi-primitive; motorized; opportunistic hunting and fishing off-shore; far east bay has potential LTF site; scenic foreground; no potential timber harvest except free use or salvage.

FIG. 3-7, "HUMAN HABITATS"



Past People and Cultural Resources

The Cultural Resource Overview of the Tongass National Forest (Arndt et al. 1987) describes the diversity of cultural heritage sites that have the potential of being discovered in southeast Alaska. The reader is directed to that report for a more detailed description of the cultural heritage of southeast Alaska. The following description is a summary of information we gathered during an extensive literature and files search for this study.

Tlingit clans used the area for hunting, fishing and possible summer camp.

Background research has revealed little about past cultural use of Bradfield Canal and even less about the study area. The Nanyaayih clan of the Stikine Tlingit traditionally claimed and utilized the Bradfield Canal area. Apparently other clans also claimed portions of the Bradfield Canal. The Katchadi and Kiksadi people occupied a village site on the southern coast of the Bradfield Canal. Each clan owned tangible property, such as salmon streams, berry patches, offshore waters for hunting sea mammals and bottom fish, and both winter and summer homes; as well as intangible property including crests, house and personal names, songs and origin myths. Ethnographic data suggests indigenous peoples utilized Bradfield Canal primarily for hunting and fishing. Chief Shakes reportedly had a summer camp in the Bradfield Canal which eventually burned. One of Vancouver's survey parties, lead by Johnstone, made the first European discovery of Bradfield Canal on August 26, 1793. Vancouver's survey party met three Indians in a canoe at the mouth of Bradfield Canal, their first such encounter since entering Ernest Sound.

Historic sites include cabins, camps and evidence of beach logging.

Historic period sites (at least 50 years old) within the study area include cabins, camps and logging-related sites. Historic period activity has been primarily limited to natural resource development and extraction. Forest Service records indicate selective hand logging began along the coast around 1916. As early as 1921 power project sites were authorized by the federal government both at Tyee Creek and the Harding River with power site classifications issued in 1927 at the Harding River and Tom Creek. There is no evidence, however, that any of these sites were ever developed. Native informants refer to at least several camps within Bradfield Canal used for trapping, hunting and fishing during the period predating 1940.

Several field surveys have been done in the study area.

The Forest Service and others have previously completed cultural resource field surveys for various activities along the Bradfield Canal, including several within the present study area. A review of Stikine Area files indicates four reconnaissance and complete surveys have been conducted within the study area prior to this study. A survey was conducted in 1980 of select locations along an alternate powerline route for the Tyee Lake Hydroelectric Project (Andrews 1980). Archaeologists performed a limited survey where the proposed route crossed Tom Creek, Frank Creek and an unnamed creek between Marten and Frank Creek. No cultural resources were recorded. Forest Service archaeologists surveyed about three miles of the study area's coastline for a timber sale planned in 1980. In 1984, three of the timber harvest units proposed in 1980 were surveyed, but no sites were identified. In 1992, Stikine archaeologists performed a survey of six locations being considered for a log transfer facility.

3 Affected Environment

These surveys, which have covered much of the study area's coastline, resulted in the discovery of five sites now included on the Alaska Heritage Resource Survey listings. A 1975 archaeological and historical survey of the region conducted by Sealaska Corporation identified no historic or cemetery sites within the study area. There are no sites in the study area which are currently listed in the National Register of Historic Places. Site and survey information is on file at the Stikine Area Supervisor's Office. This information is generally not available to the public because of site sensitivity to looting and vandalism. Site location information is specifically exempt from the Freedom of Information Act.

Probability models are used to predict the location of potential sites for survey.

The current forest-wide cultural resource probability model considers slope angle and elevation as the two primary environmental factors for establishing a high, medium or low probability for cultural resource discovery. The elevation and slope angle figures used to delimit the probability zones are general guidelines. The high probability zone is defined as all areas between mean high tide and 100 feet in elevation. The medium probability zone is defined as all areas between 100 and 1,000 feet in elevation, with slope angles of 30 percent or less. The low probability zone is defined as all areas between 100 and 1,000 feet with slope angles greater than 30 percent; all areas above 1,000 feet, regardless of slope angle and muskeg areas.

We "fine-tuned" the models for this project analysis.

We revised the cultural resource probability model for the current study based on a review of previous field surveys and known cultural resources. The high probability zone is defined as all areas between mean higher high tide and 100 feet in elevation. In addition to this the high probability zone includes areas within the marine zone, a zone around all study area streams and lakes that have historically contained anadromous fish and areas of traditional ethnohistoric subsistence use. We compressed the former medium and low probability zones to create a low probability zone which consists of all areas above 100 feet in elevation, not included within the high probability zone. We conducted field surveys for this study in areas that exceeded 300 feet in elevation, however no sites were discovered above an elevation of 50 feet.

Stikine Area archaeologists surveyed approximately 780 acres between August and September, 1992. Archaeologists surveyed most of the coastal area, including portions of the marine zone, and as high as 300 feet in elevation to determine the number and nature of study area cultural resources. This survey resulted in the addition of five sites to the Alaska Heritage Resource Survey. These sites include abandoned prehistoric camps, fish traps or weirs and various historic sites. Archaeologists recorded only 29 culturally modified trees during the survey, a low number compared to other areas on the Wrangell Ranger District.

Emphasis during the 1992 surveys was placed on the marine zone, saltwater influence zone, freshwater influence zone and saltwater-facing uplands. These are zones where cultural resources are known to exist, either in the study area or in surrounding areas. Archaeologists commonly find fish traps, rock alignments and petroglyphs in the marine zone at or near mean high tide. The saltwater influence zone typically has the highest density of cultural resources. People have traditionally utilized this zone for habitation, subsistence, recreation and related purposes. Subsistence sites, including culturally modified trees, may be located in the saltwater-facing uplands although much of this zone in the study area is steep and inhospitable.

A report was prepared for the State Historic Preservation Officer.

We prepared a report summarizing the 1992 surveys with recommendations for additional survey and submitted it to the Alaska State Historic Preservation Officer. Recommendations called for cultural resource clearance for all of the considered log transfer facilities and most of the roads and timber harvest units. A total of five timber harvest units (units # 6, 10, 26, 29 and 37) were targeted for field survey. Units 14 and 15 were later added to the survey because portions were found to fall within the high probability zone. Thus, a total of seven timber harvest units were targeted for survey. A total of about 0.5 miles of road was also recommended for survey. In addition we proposed additional survey along the Frank and Tom creek drainages and on a saddle formation which separates Tom Creek from the Harding River. The Alaska State Historic Preservation Officer approved the survey plan and agreed with recommendations of cultural resource clearance for the remainder of the project.

Stikine Area archaeologists returned in May, 1993 to complete the field survey. We surveyed an additional 329 acres and located one site in the marine zone. No other cultural resources were discovered. In conjunction with the survey effort we conducted limited test excavations at a site discovered in the saltwater influence zone. The excavations yielded a complete obsidian projectile point (arrowhead) and associated radiocarbon dates of A.D. 1360 and 1640. This is a significant discovery since complete stone projectile points are rarely found in southeast Alaska.

A total of 1,110 acres was surveyed and 11 total sites were discovered.

We surveyed almost 1,110 acres for this study, bringing to 11 the total number of discovered study area sites. The sites are represented by four fish traps or weirs, four sites with shell middens, a historic trapper's camp, a historic log platform and historic cabin remains. All of the sites, with the exception of the trapper's camp and the log platform, appear to meet the eligibility criteria for the National Register of Historic Places.

Fishing

Human use of fish resources can be traced back to use of stocks from Tom Creek and nearby streams by Native populations prior to white settlement. Bradfield Canal-origin chinook were formerly targeted during local king salmon derbies due to their large size and abundance. The current depressed condition of Bradfield Canal-origin chinook stocks appears to have been the result of a complex combination of environmental conditions and the evolution of markets, gear, harvest areas, and land and fisheries management.

Sport fishing is growing.

Sport use of Bradfield-origin stocks has steadily increased, especially in the guided and charter sector, with steelhead and chinook being targeted. Recently, the depressed condition of the steelhead population has lead to a decrease in spring outfitter and guide use. **Commercial fishing** of Bradfield-origin stocks takes place from Pt. Warde outward. Openings at Pt. Warde targeting escapement surpluses of Anan pinks also intercept Bradfield-bound chinook and other species. These openings have occurred infrequently in recent years due to greater interception of pinks closer to outside waters. Other commercial uses of the area include crabbing and shrimping.

Subsistence

The Alaska National Interest Lands Conservation Act (ANILCA, 16 USC 3113) provides the definition of and the authority to manage resources for subsistence uses. ANILCA defines subsistence uses as: "The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; and for customary trade." Congress, in passing ANILCA, intended to maintain the opportunity for rural Alaskans to practice a traditional lifestyle.

Subsistence reinforces cultural and social values.

Subsistence is economically important to Alaskans because of the remoteness of the area and the seasonal nature of resource related occupations and activities (logging, fishing, tourism). However, subsistence is more than hunting and fishing to make ends meet. It reinforces cultural and social values as well.

Originally under ANILCA, the State of Alaska continued to manage the use of fish and wildlife as long as it enacted subsistence laws consistent with the Act. However, a series of lawsuits and court rulings revealed a conflict between the State Constitution and ANILCA with respect to rural preference for subsistence uses. Thus, on July 1, 1990, the Federal government assumed subsistence management of fish and wildlife on Federal public lands. The Federal Subsistence Board is the governing body charged with the responsibility for regulation and allocation of subsistence uses of fish and wildlife. For a more thorough discussion of the history of the subsistence issue see the TLMP SDEIS (1991) and the FEIS for Subsistence Management for Federal Public Lands in Alaska (1992).

Tlingit clans claimed ownership of subsistence areas.

Historical Tlingit Clan Hunting Boundaries-The Natives of southeast Alaska had a well established property ownership system based on clan divisions (Oberg 1973). Clan property included salmon streams, hunting grounds, berry patches, sealing rocks, trapping areas, and other resource hunting and gathering locations. These lands were generally passed down from generation to generation. Permission from the clan exercising property ownership was necessary before members from other clans could use the land.

Goldschmidt and Haas (1946) performed extensive ethnographic field research in southeastern Alaska. Based on their work, it appears that virtually every bay and stream was utilized for the subsistence taking of natural resources. The authors identified land use patterns associated with southeast Alaska Native communities which existed in the mid-19th century.

Goldschmidt and Haas (1946) indicate that the Stikine Tlingit claimed a territory approximately bounded by Union Bay on the Cleveland Peninsula, north along the mainland to approximately Cape Fanshaw thence south across Kupreanof Island to include portions of Portage Bay on the north and Totem Bay on the south, across Sumner Strait to include Red Bay on Prince of Wales Island and south on that island to Thorne Bay. The Stikine Tlingit territory went a considerable distance up the Stikine River, apparently beyond the present village of Telegraph. They traded with the Tolton people of the area as well as gathered subsistence items (meat, fish, berries etc.). The Bradfield Canal area (including the study area) belonged to the Nanyaayih clan although specific sites were claimed by other clans (Goldschmidt and Haas 1946).

Communities With Subsistence Uses Within The Project Area-Most of the rural communities of southeastern Alaska rely on renewable natural resources for at least a portion of their subsistence needs. The hunting and collecting of resources used for subsistence plays an important role in the lives of the region's rural residents. It reflects deeply held beliefs, values, and attitudes. Many of these subsistence gathering activities become social events for families and communities. Some of the major resources used for subsistence are deer, salmon, moose, trout, halibut, crab, clams, berries, and waterfowl (Kruse and Muth, 1990).

In attempting to identify the communities that use the Campbell Timber Sale area, a wide range of information was consulted including the data and reports from the 1987 Tongass Resource Use Cooperative Study (TRUCS) survey and mapping effort, the TLMP Revision SDEIS, and recent ADF&G harvest and subsistence information. Based on this information the following communities have documented use of the project area for subsistence purposes: Wrangell, Craig, Meyers Chuck and Thorne Bay. All have been determined to be rural by the Federal Subsistence Board.

The Institute of Social and Economic Research (ISER, 1993) developed a guide to preparing ANILCA 810 analyses which includes criteria for which communities should be included in the analyses. These criteria include 1) 10% or more of community deer harvest in the study area, 2) harvest of marine resources in the study area, 3) historical use of the area by a community as indicated by Goldschmidt and Haas (1946), and 4) changes in access. Based on this analysis, Wrangell is the only community which met any of the criteria (criteria 2 and 3). It is the only community that will be considered in the subsistence ANILCA 810 analysis.

Important Subsistence Use Zones-The TRUCS information documents the number of households that had ever used an area for deer hunting, fishing or gathering. Up to 10% of Wrangell households have used the marine zone for harvesting marine mammals, marine invertebrates, salmon, and other finfish (Figures 1-4, Appendix D). Most upland hunting occurs in the saltwater influence zone and the saltwater uplands. Essentially 100% of this zone has been used at some time by deer hunters, while only 62% of the saltwater uplands, 12% of the freshwater influence zone and 1% of the interior uplands have ever been used by deer hunters.

Fish traps located in the estuaries at Tom and Frank Creeks indicate the traditional importance of those areas for fish harvest. The estuaries also provide habitat for waterfowl which have been harvested by Wrangell residents (Cohen 1989).

Subsistence Use By Community-Wrangell-The community of Wrangell is situated along the northern limits of Wrangell Island, some 30 air miles and 36 water miles northwest of the project area. As referenced above the Stikine Tlingit occupied the area before the arrival of white immigrants.

The Russians were the first non-Natives to establish a fort at Wrangell in 1834. The fort was later used by the British and Americans. Later the community served as the jumping off point for a succession of gold rushes into the Canadian interior. As a result, the community has experienced a series of boom and bust cycles which adversely affected the local population and economy. The 1990 US Census reported a population of 2,479. In 1987 36% of the population was Alaska Native (Cohen 1989). Per capita income for the community in 1987 was listed as \$11,989 (Kruse and Frazier, 1988). The major categories of employment in Wrangell are services (26%), forestry (16%), transportation/utilities/communications (14%), commercial fishing (14%), construction (10%), trade (8%) and local government (5%).

The Saltwater Influence and Marine Zones are most used for subsistence in the study area.

Most of the subsistence effort in the project area is expended by Wrangell residents.

3 Affected Environment

Wrangell residents hunt for moose, deer, goat, black bear, and waterfowl. They also fish for salmon, halibut, shellfish, and other finfish. In 1987, 75% of Wrangell households harvested at least one type of resource and 83% of those shared their harvest with others, resulting in a total of 95% of all Wrangell households using wild foods (Cohen 1989). Of 42 total resource types (eg, king salmon, dungeness crab etc.) reported as harvested by individuals throughout southeast Alaska, Wrangell households harvested an average of 6 resource types. Wrangellites perceived themselves as obtaining 23% of their meat from subsistence harvest (Kruse and Muth, 1990).

In 1987 Wrangell residents harvested 164 pounds of usable wild food per person (Cohen 1989). Figures 5-7, Appendix D, shows the percent and weight of harvested resources. Fish and marine invertebrates (mostly clams and crabs) are the primary resources harvested, followed by deer, other large mammals, plants and waterfowl.

Recreation and Scenery

The visual experience of many visitors to Southeast Alaska is tightly controlled by means of transport (boats, air) that keep the viewer at some distance from the resource. This is different from many North American landscapes in which the viewer directly interacts with a greater portion of the landscape. The limited area seen by the visitor accounts for most of their impression of Alaska.

In billing itself as the 'last frontier,' Alaska is playing its strongest card. Some visitors will anticipate that wilderness will be delivered to them and more often than not, it is. Timber harvest activity risks conflict between the image the visitor expects of Alaska (the last "Wilderness") and their experience.

As timber is harvested in other areas, the Bradfield will be more important.

Patterns of recreation use in Southeast Alaska have changed markedly over the last ten years, and some of the changes affect the Bradfield Canal. A visual report of ten years ago (Buschmann, 1982) cited Bradfield's viewers as "...recreationists travelling to and from the Harding River Cabin...and the Tyee Power project". Since that time the Bradfield Canal has begun to receive the spillover from the increasingly popular Anan Bay and an increase in use by outfitters and guides looking for scenic locations with attractions. In spite of a history of past use (a major electrical generating station and much logging up the Bradfield River, and the Tyee powerline corridor that follows the south shore of the inlet) no obvious visual impacts exist in the Bradfield Canal. A current of opinion among local outfitter/guides is that Bradfield Canal is the last 'untouched' waterway in the area. A look at the Tongass Land Management Plan reveals that the Bradfield will have relatively less visual evidence of harvest over time than other local viewsheds.

Guided visitor use is increasing in the Bradfield.

The Wrangell Ranger District received 21 applications for use of the Bradfield Canal area by outfitters and guides in 1993. This is an increase over a historic level of 9 permits between 1991-92. The type of guide services includes sightseeing, sportfishing and big game hunting (usually bear or goat). Group size varies from 1 to 23 clients with the mean group size centering around 4-6 clients. The outfitting and guiding season extends from April through December. Existing and desired use of the study area by outfitters and guides is presently concentrated in Tom Creek. Trends in outfitting and guiding (based on conversations with 8 of the 21 guides) suggest that the potential of the area to provide for summer fishing, sightseeing and wildlife viewing are growing, while uses such as steelhead fishing and guided hunting will stabilize or decrease. Fishing and hunting are also most susceptible to competition factors between outfitters and guides and regulation.

Tom Creek area is the most important recreation place.

The Harding River Cabin and the Anan Cabin are the only recreation cabins in the Bradfield. The use levels of the Harding Cabin have remained fairly stable over the past ten years. The Anan Cabin is the most popular cabin on the Wrangell Ranger District. Recreation use in the study area itself is generally concentrated around Frank and Tom Creek. The Tom Creek area is the most important recreation place on the study area based on public scoping for this project, information received from outfitters and guides, the scenic diversity and the presence several lakes.

The "seen area" can be divided into four areas.

Commercial shrimpers and crabbers frequent the Bradfield Canal. Occasionally, the Alaska State Ferries have cruised the adjacent Ernest Sound and Blake Passage as a variation on the Ketchikan-Wrangell run, affording passengers a lingering five- to six-minute view of Bradfield canal's first four miles.

The Campbell study area covers the face of a peak, fronting on the Bradfield Canal. This **"West Face"** is a shallow bowl extending four miles along the inlet, ending in a long, tapering east ridge that blocks most of the view further up the Bradfield. The shape of the bowl is simple, concealing very little, its texture unrelieved by rock features or major openings apart from an alpine fringe at the upper edge and two well-incised drainages converging at the base.

Continuing east, the **"Frank Creek Valley"** divides the west face from, **"Hollywood Bowl,"** a 1200' foot plateau-shaped hill whose south side forms a deep basin. Unlike the west face, Hollywood Bowl's enclosing ridges wrap around a little valley at their center, concealing some of its terrain from view.

To the east of Hollywood Bowl is **"Tom Creek Valley."** Tom Creek is contained on the east by two miles of hummocky, relatively low terrain whose indistinct, multi-summitted ridge forms the east boundary of the study area. One mile from the mouth of Tom Creek a very low divide separates this stream from the Harding River, a candidate for Wild and Scenic River status.

Tom Creek has the highest scenic quality in the study area.

Variety Class refers to the scenic quality of a landscape. Generally, landscapes with more variety are rated higher (A) than those with minimal variety (C). The landscape of the **Coast Range** Character type includes many dramatic alpine landforms and fjord-like rock walls, escarpments and spires. Bradfield Canal is a less striking version of this landscape. Most of it is rated as "B", or common, for this character type. The hummocky area in Tom Creek that separates it from the Harding River is rated "A", distinctive due to the presence of Tom and Campbell Lakes and more dramatic rock and terrain features. No "C"--minimal variety--exists in the study area.

The Bradfield Canal is the main travel route.

Sensitivity Levels measure the public's concern for the scenic quality of forest lands. In the study area the most sensitive, Level 1 lands are on the south-facing slopes that can be seen by recreationists heading to/from Anan Bay and Blake Channel. Much of the rest of the study area which is seen from the Bradfield is classified as Level 2, reflecting the status of the canal as a secondary travel route. "Unseen" areas from the canal which include the majority of the VCU are classified as Level 3.

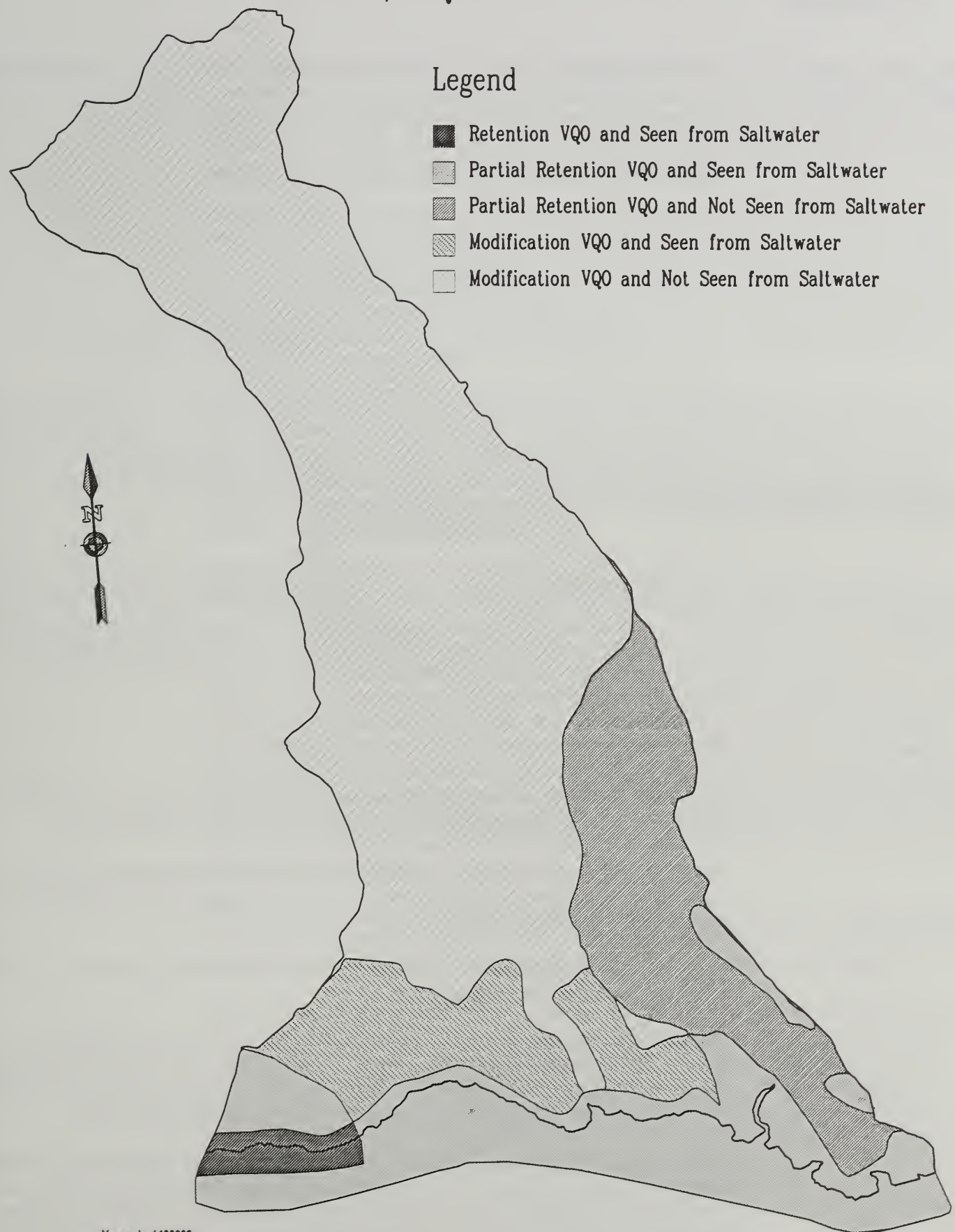
3 Affected Environment

Visual Quality Objectives (VQO's) are an indication of the inventoried value of the landscape's scenery. Three factors make up the VQO: the closeness of the viewers to the landscape (foreground, middleground and background), the sensitivity level of the viewers, and the variety class. In general, those areas shown in Figure 3-8 as "Retention or Partial Retention" have a higher value than those shown as "Modification." However one exception exists. Although the beach fringe areas along the steep West Face by definition are closer to the viewer and therefore rated higher by the inventory, an important aspect of this area is the absence of a good separation between the foreground and middleground. Therefore, functionally the area should be treated as one visual unit because there is no distinct separation between the observer and the base (NF Landscape Management, Vol.2, Ch.5).

The study area presently appears unmodified.

The Existing Visual Condition of the entire study area is classified as unmodified (EVC Category 1). The **Characteristic Landscape** of the study area is relatively homogeneous in appearance with alpine and scrub forest areas adding some visual variety and texture to the landscape on the West Face. The valleys of Frank and Tom Creek appear as evenly forested, "rolling hills" to the viewer from the Bradfield Canal. The characteristic landscape appears somewhat different to the hiker traveling up the Tom Creek valley. This landscape has more vegetative variety (a mix of forest and muskeg), water features and more dramatic peaks and mountain tops. In the Bradfield area, there are areas where denser forest gives way to scattered trees near alpine. This gives the viewer a sense of already existing "texture" in the landscape which is an important characteristic when planning vegetation management activities.

FIG. 3-8, VQO's AND SEEN AREA



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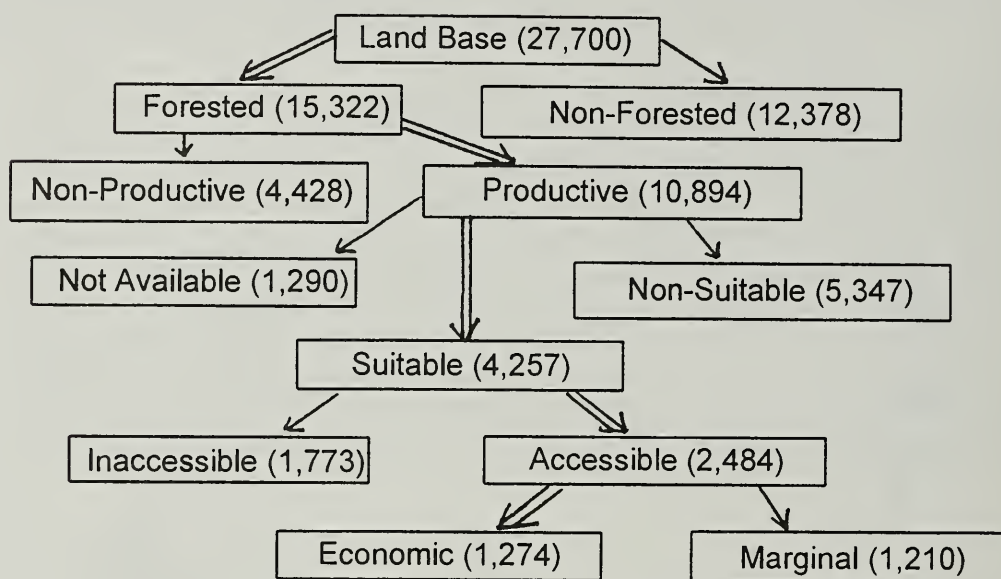
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Scale is 1 inch = 158 miles

Timber Harvest and Production

There are approximately 27,700 acres of land within the zones of the Campbell Project Area. Depending on the vegetative cover, this land has been classified for its value for timber production. Figure 3-9 illustrates the classification matrix.

Figure 3-9, Timber Lands Classification Matrix



Forested Land refers to National Forest lands that consist largely of timbered vegetation; it is further categorized as Productive or Non-Productive Land.

Non-Forested means National Forest Land that is unable to support a cover of predominately forested vegetation. This includes muskegs, rock-outcroppings, talus slopes, and lakes and streams.

Non-Productive means forest land that does not support enough timber volume to meet the criteria of commercial forest land.

Productive (Commercial Forest Land) means land that is capable of producing continuous crops of timber. TLMP specified that in order to be capable of commercial timber production, the land must be able to produce at least 20 cubic feet/acre/year, or inventoried as having at least 8 thousand board feet (MBF)/per acre.

Not Available These areas include the productive forest land that has been withdrawn from timber production and is not available for harvest. These lands include: 100-foot buffers mandated by the Tongass Timber Reform Act (TTRA) on certain fish-bearing streams, 500-foot buffers around saltwater shoreline, 1,000-foot buffers around estuaries, and 330-foot buffers around all known eagle nests.

Non-Suitable Land These Lands are identified as Productive Land that contain at least 8 thousand board foot of timber per acre but are not suitable for timber production. Non-Suitable lands are those in which potential resource damage could occur due to unstable soils or oversteepened slopes, poor probability of regeneration, irreversible resource damage to soil productivity, water quality or watershed conditions.

Suitable Land These lands are identified as having the biological capability, and availability, to produce industrial wood products. To be considered Suitable, land must be capable of harvest with available technology to ensure timber production without irreversible resource damage to soil productivity or watershed conditions, be capable of being restocked within 5 years after final harvest, and not be withdrawn from timber production by Act of Congress. Suitable lands are further categorized as accessible or inaccessible.

Some lands are a suitable/ non-suitable complex.

Some lands within the Campbell study area which are classified as "suitable" are a complex of suitable/non-suitable areas. Due to the geologic conditions, these sites contain patches of suitable areas interspersed by rock outcrops or erosive soils. Since the helicopter is the predominant yarding method, these complexes were classified as suitable since they can be logged by helicopter. If harvested, only the suitable microsites would actually be cut.

There are 2,484 acres with potential for timber production but only half are economical to log.

Accessible These lands have been identified as site specific areas available for timber harvest supported by a largely aerial transportation network. Within the study area these lands extend 1 mile from shore or the end of planned roads. Accessibility for timber production in the study area is difficult and expensive. Harvest methods rely mostly on helicopters for access. Roads simply provide further access up Frank and Tom Creek to shorten yarding distances for the helicopter. For this reason, the roughly half of the accessible lands are not economical to log under present and realistically foreseeable market conditions. Therefore, we divided up the accessible lands into two categories; **Economical** and **Marginal**. Part of the transportation network relies on saltwater for direct drops and transport of logs. Three separate transportation systems are needed to log all the accessible portions of the study area: 1) the west face drop area and sortyard/LTF, 2) the Frank Creek road and LTF and 3) the Tom Creek Road and LTF.

Inaccessible These lands have been identified as being more than 1 mile from shore or the furthest extent of feasible roads. Physical limitations make harvesting of trees extremely uneconomical under current technology and economic conditions.

Figure 3-10 shows the distribution of the suitable timber harvest lands and the extent of the accessible lands. Table 3-8 shows that most of the accessible timber lands are located in the Saltwater Uplands. The percentages shown in Table 3-8 reflect the percentage of the zone by class. The table shows that 39% of the Saltwater Uplands are accessible. The Freshwater Influence Zone has the second greatest timber production capability of the three zones that support potential timber harvest.

Table 3-8, Timber Land Classification by Ecological Zone (% of each zone in a certain classification is shown).

					Accessible	
Zone	Total Acres	Forest-ed Acres	Productive	Suitable	Econ.	Marg.
Saltwater Influence	857	811 (94%)	773 (90%)	0 (0%)	0 (0%)	0
Freshwater Influence	6382	3818 (60%)	2351 (37%)	1245 (20%)	347 (5%)	350 (5%)
Alpine Brush	11125	1357 (12%)	0 (0%)	0 (0%)	0 (0%)	
Saltwater Uplands	3254	3254 (100%)	3146 (97%)	1248 (38%)	739 (23%)	509 (16%)
Interior Up-lands	6082	6082 (100%)	4624 (76%)	1764 (29%)	188 (3%)	351 (6%)

Commercial forest land in the Tongass National Forest has been classified into four volume classes. These volume classes were obtained from the TIMCLU GIS Data Base. Field crews conducted on the ground evaluations and verifications of volume classes of most accessible areas. Timber cruise information from the 1984 sale was analyzed and also used in verification and updating of the TIMCLU Data Base. Table 3-9 displays the volume range for each volume class and the total acres of productive, suitable and accessible volume classes in the study area. Figure 3-11 shows the distribution of these volume classes throughout the accessible lands.

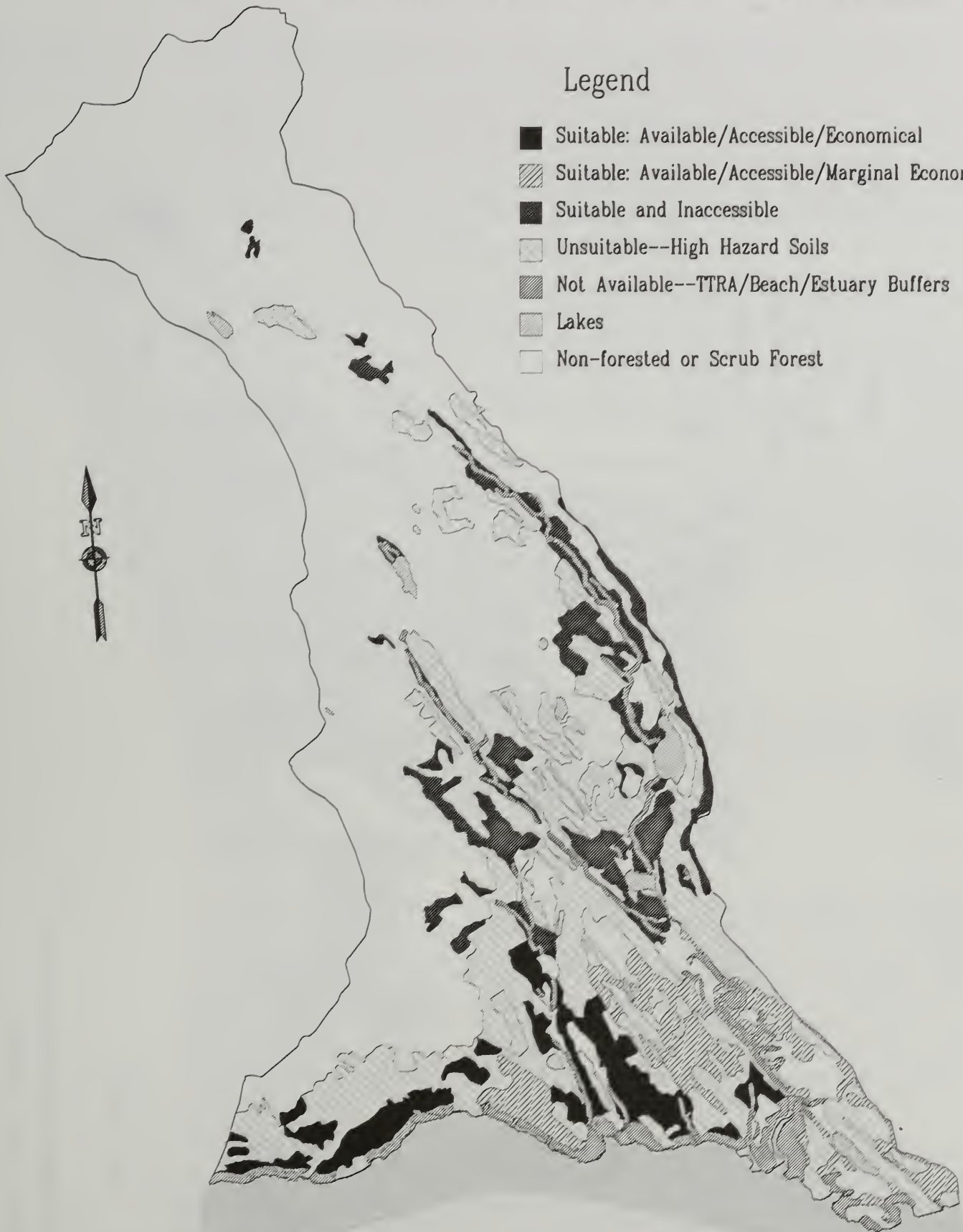
Table 3-9, Timber Volume Classes in the Study Area

				Accessible Lands	
Vol- ume Class	Range of Volume	Productive Lands	Suitable Lands	Economic	Marginal
4	08-20 MBF/Acre	4711 acres	1401 acres	204 acres	536 acres
5	20-30 MBF/Acre	5254 acres	2472 acres	965 acres	632 acres
6	30-50 MBF/Acre	930 acres	384 acres	105 acres	42 acres
7	50 or > MBF/Acre	0 acres	0 acres	0 acres	0 acres

FIG. 3-10, PRODUCTIVE FOREST LANDS

Legend

- Suitable: Available/Accessible/Economical
- ▨ Suitable: Available/Accessible/Marginal Economics
- Suitable and Inaccessible
- Unsuitable--High Hazard Soils
- ▨ Not Available--TTRA/Beach/Estuary Buffers
- ▨ Lakes
- Non-forested or Scrub Forest



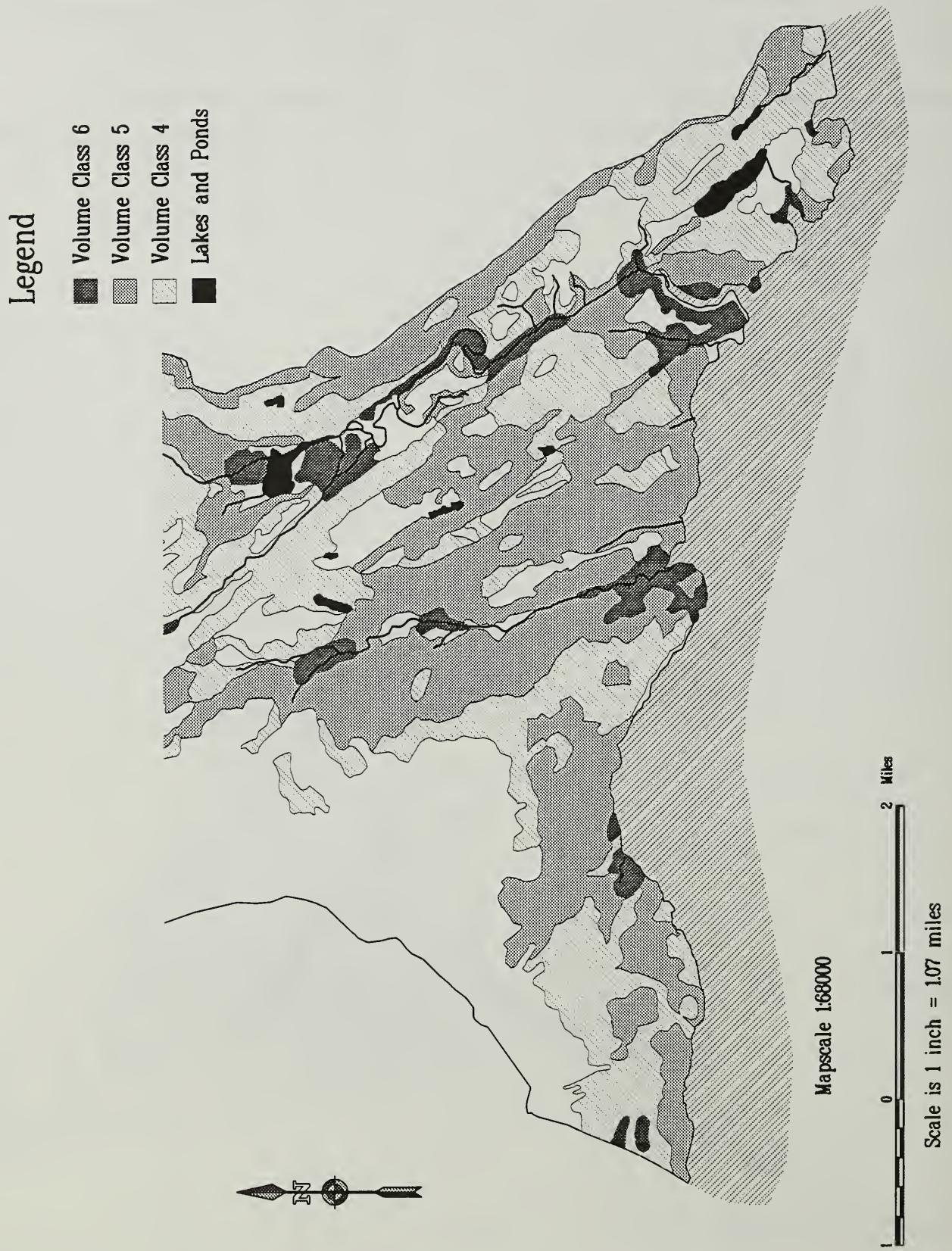
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Scale is 1 inch = 1.58 miles

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FIG. 3-11, TIMBER VOLUME CLASSES



Area Rural Development

The Tongass Land Management Plan dedicates a large portion of the Bradfield Canal area to non-timber production allocations such as primitive and semi-primitive areas. These designations reflect the general poor quality of the mainland timber producing lands and the high values for wildlife, fish and recreation. The Campbell VCU is surrounded by semi-primitive and primitive areas to the east and west. The only other timber production allocation in the canal, is located to the south of the study area and is also surrounded by primitive and semi-primitive allocations. The Bradfield River VCU's, further inland of the canal, are allocated to timber production but most of the timber has already been harvested.

The Bradfield Canal landscape could change if all planned and proposed development takes place. In addition to the proposed Campbell Timber Sale, the Tongass 10 year harvest plan proposes that the area immediately to the south be considered for a timber sale (Canal-Hoja Timber Sale) in 1996. Several road and utility corridors are also proposed. Although the timeline on these is extended and uncertain, they could have a dramatic effect on the numbers of people using the area.

Increased recreation and tourism is also likely in the area over time as independent and guided visitors search for increasingly rare natural looking areas with access. Tourism could become increasingly important in the near future as Wrangell and the surrounding communities attempt to stabilize their economies by stimulating economic diversity. The Bradfield area offers much in the way of these opportunities as long as the attractions; fish, wildlife and scenery are maintained.

Ecological Zones

We divided the study area into six ecological zones (See Figure 1-2 and Figure 3-12). In the following discussion we describe the major ecosystem processes occurring in each zone and how they relate to planning issues outlined in Chapter 1.

The Marine Zone

The Marine Zone includes those bodies of saltwater of Bradfield Canal in the study area: deep water as well as estuarine habitats. The Marine Zone meets the Saltwater Influence Zone at the mean higher, high tideline (See Figure 3-12). Saltwater is used as a staging platform and transportation medium for timber harvest activities. The construction and use of Log Transfer Facilities and transport of harvested logs could affect the productivity and function of the marine system (See Planning Issue #3, Chapter 1). Effects on the productivity of the marine system could affect the use of these areas by fishermen. The actual logging itself may also temporarily displace the users of the Bradfield area (See Planning Issues #8 and #9, Chapter 1).

Sensitive habitats include tideflats, salt marshes, kelp and eelgrass beds, and shellfish concentration areas. These relatively shallow areas are highly productive for a number of reasons and serve as "nurseries" and rearing areas for a number of shellfish and finfish species. These areas are also important to resident and migrant waterfowl. The saltwater habitat is divided into zones based primarily on natural processes related to depth and movement of water: 1) estuarine; 2) intertidal; and 3) offshore.

3 Affected Environment

Estuaries

An estuary is defined as the interface where freshwater drainage from the surrounding hillslopes mixes with saltwater. The boundaries of estuaries usually are represented by some combination of salinity and depth. The more productive estuaries are semi-enclosed by land and include bays, coves, harbors, and inlets. Those areas that have salt marshes are the most productive. This area of varying saline concentrations is critical in the life of some species, the better known of which are salmon and shellfish. Adult salmon use estuaries as staging areas for upstream migration and juveniles and smolts use them as rearing areas.

There are three estuaries in the study area.

Any area where saltwater and freshwater mix can be considered an estuary. For management purposes there are three defined estuaries in the project area which are buffered (the 1000 foot buffers lie in the Saltwater Influence Zone, see figure 3-12). The most important of these estuaries are located at the mouth of Tom and Frank Creeks. The bay to the east of Tom Creek is also considered to be a small estuary.

Estuaries are nutrient rich areas important to many species.

All estuaries have two things in common: 1) the harshness of the physical and chemical environment; and 2) the high concentration of nutrients. Environmental harshness is created by gradients in salinity and temperature resulting from the mixing of fresh and saltwater. The abundant nutrients combined with shallow conditions and warmer temperatures cause the estuaries to be rich in phytoplankton, and hence zooplankton and fish. Several features of estuaries contribute to the "trapping" and recycling of nutrients, the most subtle of which is the saltwater itself which causes nutrients to drop out or be pushed back to the head of the estuary. Productivity of estuaries is a function of the freshwater-saltwater mixing which results in the deposition of dead organic matter (detritus) for recycling by invertebrates and the localized concentration of nutrients in solution.

Intertidal Area

The intertidal area is most often defined in terms of political jurisdiction: that area of periodically submerged land between mean higher, high tide and mean lower, low tide. Basically, it is that area commonly known as "beach" that is exposed between the highest and lowest spring tides. Only a very few specialized plants and animals use this area permanently. The mobile animals that visit this area on the tide are primarily opportunists coming to graze or prey on other inhabitants or otherwise exploit the concentration of nutrients created by water contact and light penetration. Productivity of intertidal areas is primarily a function of slope, surface coarseness or irregularity, and deposition/displacement of detritus. The two types of intertidal areas found within the study area include rocky and sand/gravel beaches. Both are important rearing areas for the younger life stages of shellfish and finfish. Coastal areas with steep, rocky intertidal shores near peninsulas are favored by otters because these areas attract the fish that otters eat. Short steep intertidal areas on rocky points, which are especially abundant on the western half of the study area, are optimal for river otters.

Offshore Area

The offshore area extends from the low-water tide mark and includes the nearshore and deep water areas. Productivity of this area is a function of water circulation and light penetration. Upwellings bring nutrients up from the bottom to be recirculated in the upper portion of the water column. An important part of the offshore area are the nearshore submerged lands. This area lies adjacent the intertidal zone. This is where most commercial shellfishing and sport fishing takes place within the proposed operating area due to the concentrations of adult species found there associated with other elements of the food chain. Small numbers of Harlequin ducks were commonly seen in the nearshore water within 1/2 mile of the Tom Creek estuary. The boundary of this zone is usually defined by depth.

Nearshore areas are important areas for fishing.

Several species use both nearshore and offshore environments. Seals are common in the waters adjacent to the study area and feed on salmon and other fish returning to Tom and Frank Creeks. Approximately a dozen harbor seals (*Phoca vitulina*) used a haul-out about a mile east of the mouth of Tom Creek in late summer 1992. Marbled murrelets were commonly seen in the nearshore and deep water areas of the Bradfield Canal in 1992. A density of 7 murrelets per km² was found in July 1992 during near-shore surveys along the north shore of the Bradfield Canal. Steller sea lions are a threatened species that could occur in the marine zone of the study area. No Steller sea lions were sighted by Forest Service personnel in the Bradfield Canal during 1992, and no rookeries or haul outs occur nearby (S. Zimmerman, NMFS, correspondence dated 2/8/93). However, sea lions are known to occur in Ernest Sound and other nearby waters.

The offshore zone contains potential habitat for the endangered humpback whale. No humpback whales were seen in the area during presale activities in 1992 and there are no records of any sightings in the Bradfield Canal (E. West, the Nature Conservancy, correspondence dated 9/23/92). However, they have been recorded in Ernest Sound and other waters adjacent to the Bradfield Canal.

The Saltwater Influence Zone

Vegetation structure, south facing slopes, low elevation, and proximity to saltwater are characteristics of this zone that contribute to its particular importance to wildlife (See Planning Issue #2, Chapter 1). Due to these factors and access they have been especially important to the culture of southeast Alaskans for centuries (See Planning Issue #8, Chapter 1). Although timber harvest does not occur, transportation systems will be constructed and operate within this zone pictured in Figure 3-12.

Habitat Relationships

The habitat capability models indicate that this zone has, on average, the most valuable habitat for deer, brown bears, marten and hairy woodpeckers (See Table 3-10). The old growth forest structure stimulates understory vegetation production and provides snow interception. The additional influences of south facing slopes, low elevation, and the close proximity of salt water increase local temperatures, thus reducing snow accumulations. These processes make the Saltwater Influence Zone the most valuable for marten and deer winter habitat (See Table 3-10 and Figure 3-13 and 3-15) on the study area. Reduced snow levels make marten prey and deer forage more available. Deer occur in the study area but populations are not large and traditional hunting use is low. Marten populations in the study area are apparently in good condition (ADF&G 1991).

FIG. 3-12, ECOLOGICAL ZONES

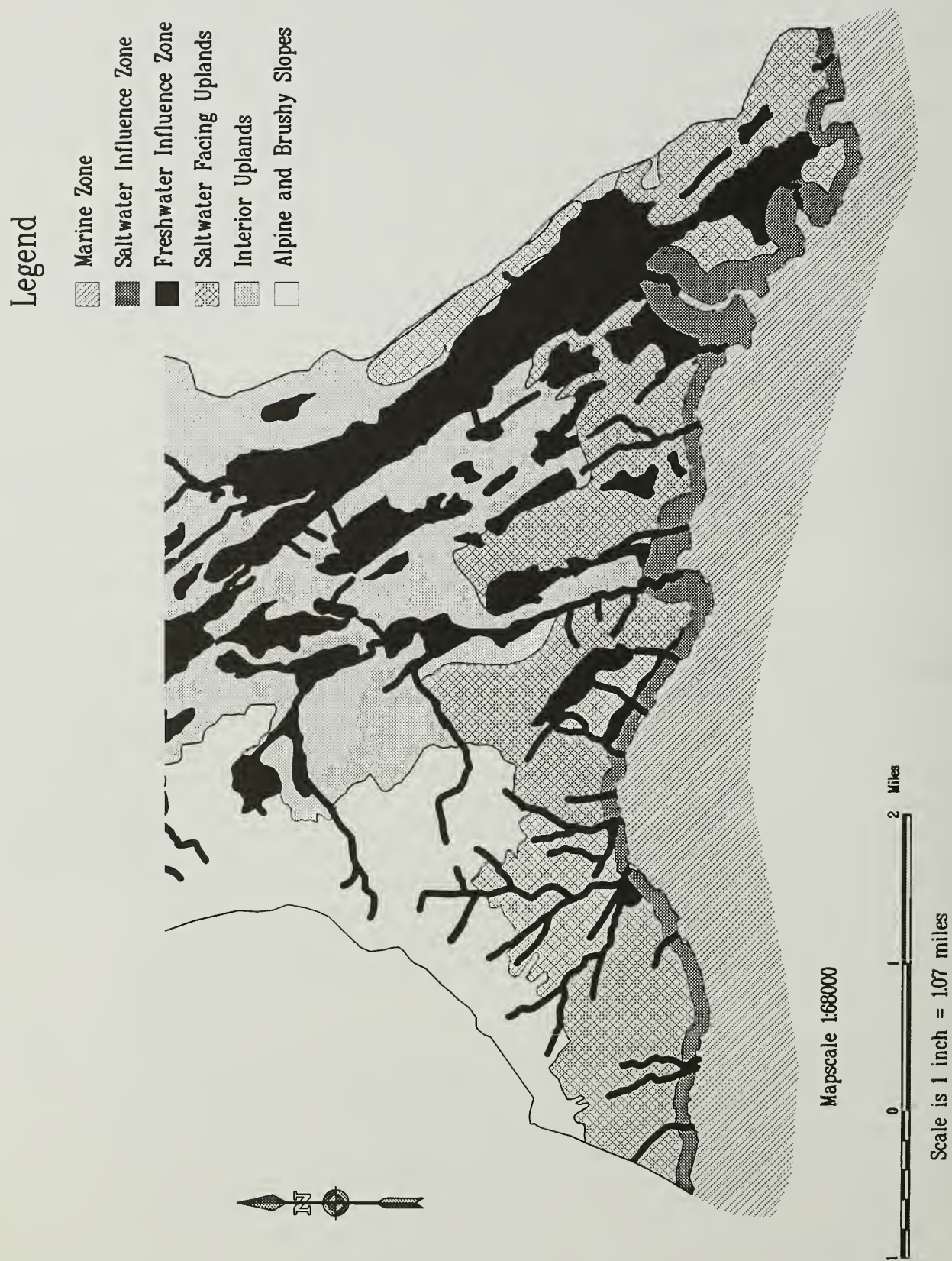


Table 3-10, HSI Value & Rank By Zone

Species	Ma-rine	SIZ	FIZ	Salt-up	Int-up	Alpine
Brown Bear, HSI Brown Bear, HSI rank	0 6	0.50 1	0.30 4	0.35 2	0.35 3	0.21 5
Deer, HSI Deer, HSI rank	0 6	0.39 1	0.10 4	0.27 2	0.19 3	0.00 5
Goat, HSI Goat, HSI rank	0 6	0.14 3	0.07 4	0.24 1	0.17 2	0.05 5
Marten, HSI Marten, HSI rank	0 6	0.83 1	0.31 4	0.57 2	0.46 3	0.01 5
Hairy HSI Wdpck, HSI rank	0 6	0.52 1	0.20 4	0.41 2	0.32 3	0.00 5

Snags provide forage, denning and nesting areas.

The dynamic age structure of old growth forests provides a constant supply of snags and large trees that are important habitat components for hairy woodpeckers and marten. In the plant associations predominating on the study area (western hemlock and Sitka spruce) there are an estimated 2 - 14 snags per acre that are greater than or equal to 15" dbh (B. Pawuk, USFS, unpubl. data). Hairy woodpeckers are primary cavity excavators, which means they create cavities which may be used by other bird and mammal species after the woodpeckers vacate them. They typically excavate nests in snags and live trees with heart rot. Their preferred habitats include high tree basal area, tall canopy, and large diameter trees (Connor and Adkisson 1977 from TLMP SDEIS) and therefore the HSI values show the importance of this zone (Table 3-10 and Figure 3-14). Snags and down dead wood provide cover (dens) for martens and habitat for their prey. River otters use cavities between large rocks and under large snags and live trees for den sites (Larsen 1983).

Eagles usually nest in this zone.

The presence of large, flat-topped, open crowned trees and snags provide ideal nesting and perching sites for bald eagles. The multi-level canopy allows access to those trees while the adjacent marine zone provides access to food. All known bald eagle nests within the study area are in this zone. Aerial surveys conducted by the US Fish and Wildlife Service prior to 1992 located 4 nests (US Fish and Wildlife Service bald eagle nest atlas). Two are located near the mouth of Tom Creek and the other 2 are located in the beach fringe along the West Face. Two nests, one each at Tom Creek and the West Face could not be found during aerial, boat and ground surveys in 1992. These nests were also not located by the FWS on their last survey in 1987. An additional nest was found by Forest Service personnel in 1982 on the peninsula west of Frank Creek and was relocated in 1992. All three nests that were located in 1992 were active. However, only the nest along the West Face produced young. The nest at Tom Creek had eggs in April but the adults were not seen at the nest later in the year and evidently abandoned the nest. Adults were seen at the nest near Frank Creek but no eggs or young were ever seen.

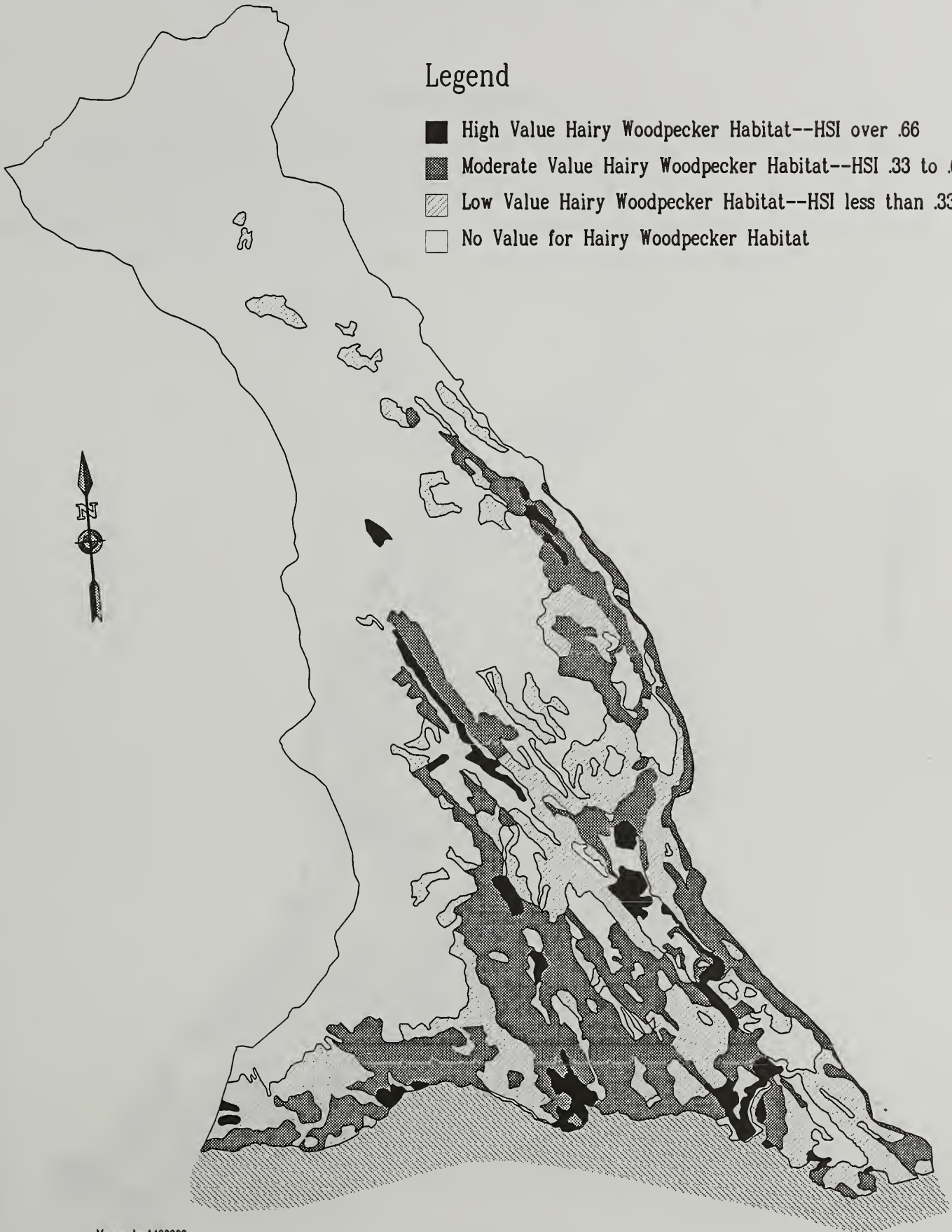
FIG. 3-13, MARTEN HABITAT



FIG. 3-14, HAIRY WOODPECKER HABITAT

Legend

- High Value Hairy Woodpecker Habitat--HSI over .66
- ▨ Moderate Value Hairy Woodpecker Habitat--HSI .33 to .66
- ▧ Low Value Hairy Woodpecker Habitat--HSI less than .33
- No Value for Hairy Woodpecker Habitat

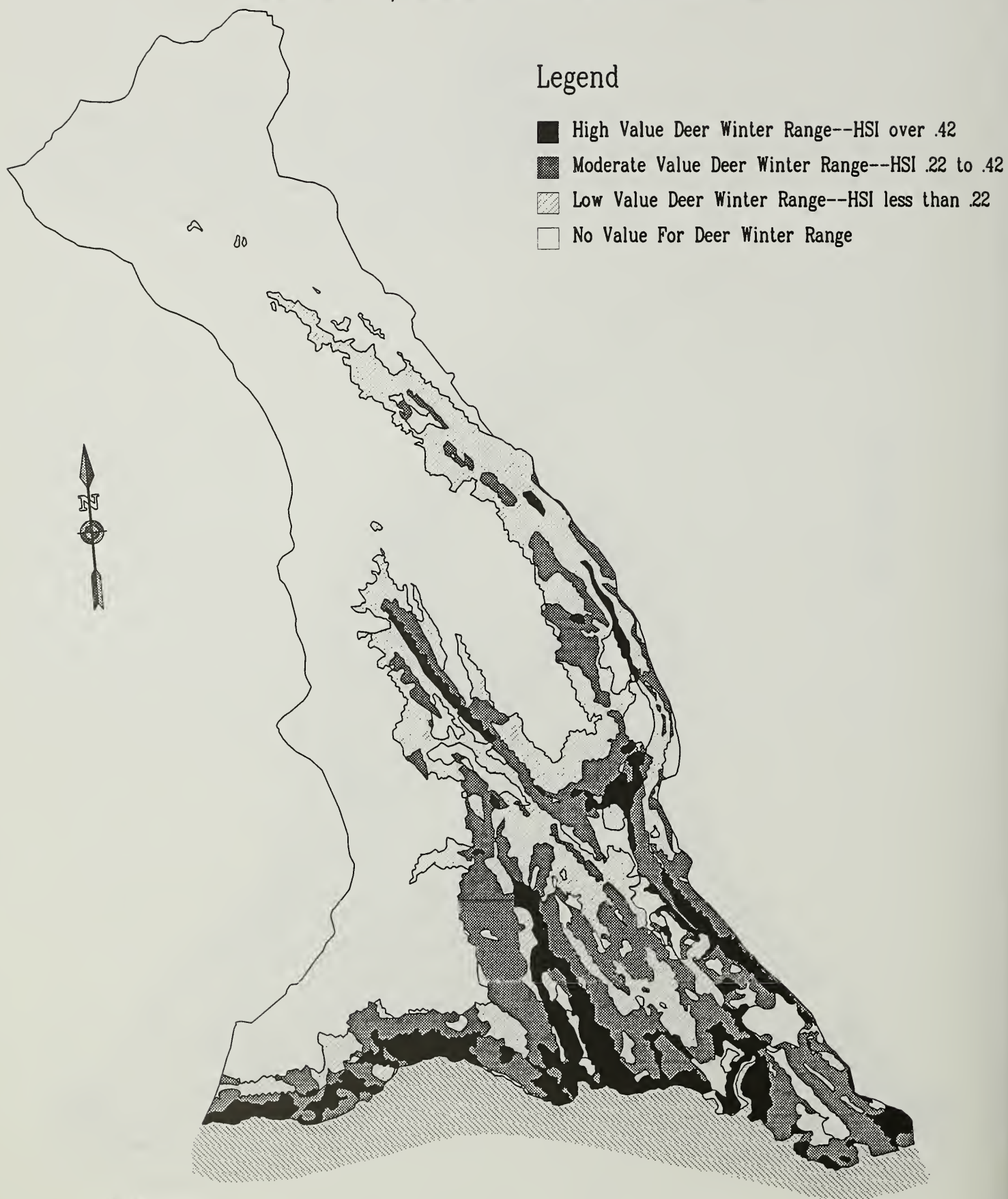


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1 0 1 2 Miles

Scale is 1 inch = 1.58 miles

FIG. 3-15, DEER WINTER RANGE



Mapscale 1:100000

1 0 1 2 Miles

Scale is 1 inch = 158 miles

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FIG. 3-16, BROWN BEAR HABITAT



Map scale 1:100000

1 0 1 2 Miles

Scale is 1 inch = 158 miles

There were 2 possible sittings of goshawks on the study area reported in 1992, one of which occurred in this zone. The forests in this zone (as well as the freshwater influence, upland interior and upland saltwater-facing zones) could provide potential nesting and foraging habitat. Surveys conducted in July using recorded wailing and begging calls did not elicit any responses. Thus, we were unable to confirm the presence of goshawks on the study area or document nests. Use of this zone by murrelets for breeding is possible because many of the murrelets seen were paired and young of the year were seen in late summer. However, it is not known whether they nest in coastal or upland forests in Alaska (Mendenhall 1992).

Sedge meadows are important to waterfowl and bear.

The small patches of sedges and grasses that occur along the upper beaches and in the bays and estuaries are the first areas for vegetation to sprout in the spring. This provides foraging sites for bears and Vancouver Canada geese in early spring. The importance of these sites is reflected in the high habitat suitability values for brown bears in this zone (Table 3-10, Figure 3-16) and is confirmed by observations of bears, geese and their sign at these sites. The sedge meadows adjacent to the intertidal mudflats at Tom Creek provide important feeding and resting areas for migrating waterfowl and shorebirds.

Corridors

The Saltwater Influence Zone is an important travel corridor for wildlife in the study area. This zone will become particularly important if harvest occurs on the uplands adjacent to this zone. The specific areas of this zone which are most important to wildlife lie along estuaries and the west face of the study area. This zone is also important to the viewer's perception of the scenery, offer opportunities to see wildlife and are also key areas for recreation activities.

The Freshwater Influence Zone

Although all zones have important elements and processes occurring within them, this zone can claim the distinction of providing the greatest linkages between zones. This linkage is not only physical but functional in that water, nutrients, wildlife and people flow between other zones using the pathways of the Freshwater Influence Zone. The productivity and function of this zone is one of the key planning issues (See Planning Issue #1, Chapter 1).

Water influences all of the zones defined for this analysis, but is, by definition, concentrated in this zone. The zone encompasses all open channel systems, streamside zones, high hazard soils adjacent to streams, lakes, all riparian soils, non-forested wetlands, and forested wetlands in a complex with non-forested wetlands. Table 3-11 illustrates the various components of the FIZ. The components are described in more detail below.

Table 3-11, Components of the Freshwater Influence Zone

FIZ Component	West Face Watersheds	Frank Creek A27A	Tom Creek A30
Riparian Soils	8 acres	39 acres	340 acres
TTRA Buffers	3 acres	120 acres	683 acres

**Table 3-11, Components of the Freshwater Influence Zone
(continued)**

FIZ Component	West Face Watersheds	Frank Creek A27A	Tom Creek A30
AHMU Class 3 Buffers	331 acres	148 acres	1348 acres
Active Slumps near Streams	0	0	21 acres
Muskegs	0	315 acres	1880 acres
Lakes	0	8 acres	187 acres
Lake Buffers	0	10 acres	142 acres
Wetland Complex	97	0	88 acres
Misc. Upland Inclusions	0	0	102 acres
Total FIZ Acres	439 acres	640 acres	4791 acres

TTRA buffers: These are 100' buffers on either side of Class 1 streams and Class 2 streams which flow directly into Class 1 streams. These buffers were mandated by Congress in the Tongass Timber Reform Act (TTRA). Management activities within these buffers are prohibited or severely restricted. These buffers are varied, containing muskegs, forests, riparian soils, other wetland types, high hazard soils, actively slumping sandy banks, etc.

100' buffers of class 3 streams: Management activities in these areas can affect the water quality of these streams, especially temperature & sediment. These effects can continue downstream below the actual activity area. These buffers are varied, containing muskegs, forests, riparian soils, high hazard soils, etc.

Riparian soils outside of stream buffers: Self explanatory. Riparian soils occurring outside of the TTRA and Class 3 buffers.

Actively slumping areas near streams: There are several areas in lower Tom's Creek of massive sandbanks that are actively slumping into the stream. In one area these even extend beyond the 100' TTRA buffer and are shown in Figure 3-17. These areas were considered to be even more significant than merely "high hazard" soils and worthy of mapping separately and being included in the FIZ since they have a major effect on water quality.

Lakes and ponds: Self explanatory.

100' Buffer of lakes and ponds: Self explanatory, Forests in these buffers contribute large woody debris to the lakes as well as filter sediments.

3 Affected Environment

Muskegs and scrub forests: Most people know what a muskeg is. They tend to have wet, anerobic, acidic soils with very low productivity, as opposed to fresh water marshes which have aerobic, neutral soils and are highly productive. Scrub forests occur on similar soils to muskegs, but are slightly better drained, allowing trees to grow. These trees are stunted and these stands are considered non-commercial/non-productive (i.e. there's less than 8,000 bf/ac).

Forested Wetlands: Commercial/productive forests (i.e. greater than 8,000 bf/ac) occurring on wet soils.

Wet/Non-wet complex forests: Intermingled wet and upland soils with productive forest cover (i.e. greater than 8,000 bf/ac). The individual components are too small to map separately.

Pockets of uplands within other wetlands: These are small mapped, generally forested stands surrounded by wetlands, making more sense to manage with the FIZ than one of the upland zones.

The breakdown of zones in the 3 largest watersheds on the study area are given in Table 3-12. The table illustrates that most surface and near-surface water processes (Freshwater Influence Zone) occur in the range of 15% to 25% of a watershed's total area. These watersheds are shown in Figure 3-4.

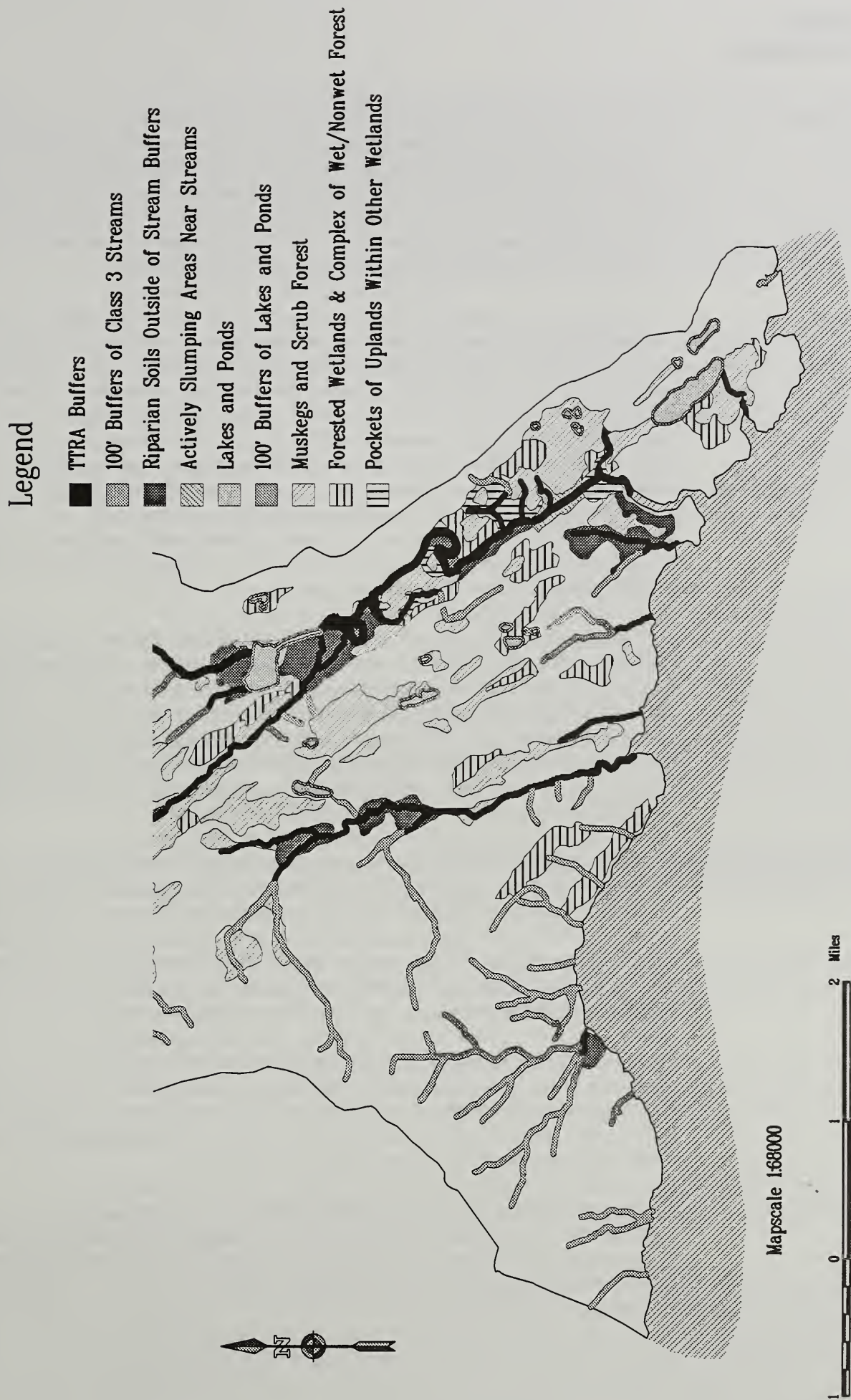
Table 3-12, Zone Breakdowns of Three Watersheds

Zone	A24A, 1005 total acres	Frank Creek, A27A, 3290 total acres	Tom Creek, A30E 19,065 total acres
FIZ	16%	19%	24%
SIZ	<1%	<1%	<1%
ALPINE	49%	29%	49%
SALT-UP	34%	16%	2%
INT-UP	0	36%	25%

The FIZ links all other zones.

The Freshwater Influence Zone is comprised of the **riparian ecosystem**, the **aquatic ecosystem**, and the **wetlands ecosystem**. The components of the Freshwater Influence Zone within the Study Area is depicted in Figure 3-17. The combination of the aquatic and riparian ecosystems is equivalent to the **riparian area** described in the DEIS for the TLMP Revision. The riparian, aquatic, and wetlands ecosystems are linked by natural processes and can only be separated for the purpose of discussion. Water, sediment, and wood, the key constituents of the aquatic ecosystem, have their origin in or pass through the riparian ecosystem. Those habitat elements generated solely within the aquatic environment are regulated or otherwise affected by the adjacent riparian ecosystem. Processes linking the ecosystems include, but are not limited to, windthrow, litterfall, runoff, leaching, erosion, sedimentation, and shading.

FIG. 3-17, COMPONENTS OF FRESHWATER INFLUENCE ZONE



The Riparian System

Water influences the diverse mix of plant communities.

The riparian ecosystem is defined as the transition between the aquatic ecosystem and the adjacent terrestrial ecosystem. It is identified by hydric (wet) soil characteristics or hydrophytic vegetation communities that require free or unbound water. The National Forest Management Act (NFMA) directs that special attention shall be given to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes, and other bodies of water. This area shall correspond to at least the recognizable area dominated by the riparian vegetation (36 CFR 219.27).

Floodplains in the Campbell Area are found in the broad U-shaped valleys of Toms Creek and Franks Creek. Several small alluvial fans occur at the base of steep mountain slopes. Some are dominated by riparian forest vegetation, primarily mixed Sitka spruce/western hemlock plant communities with an understory of devil's club, salmonberry and blueberry. The riparian area also has the greatest percentage of the Mixed Conifer plant association (30% of zone) and Sitka spruce plant association (31% of zone). Soils are typically deep, well drained soils developed in alluvial sand and gravel with relatively thin surface organic layers. Other floodplain areas are wetland freshwater meadows with poorly drained organic soils, such as the area below Tom Lake. Approximately 863 acres of floodplains have been identified in the study area using the soil resource data base for initially determining the location and approximate boundaries of floodplains.

Congress, via the Tongass Timber Reform Act (TTRA), further recognized the many important influences riparian vegetation has on the stream ecosystem by establishing 100-foot minimum streamside buffers along important fish streams. Some of these influences include: 1) falling leaves and needles provide sources of nutrients, 2) insects that fall into the stream as part of the food web, 3) logs and branches provide channel structure by retaining organic matter and sediment, and provide cover, 4) roots stabilize streambanks and maintain undercut banks, 5) tree canopies provide thermal protection and reduce extremes in temperature.

Many species of wildlife use the riparian forest.

The riparian forest is the interface between terrestrial and aquatic systems and provides habitat for terrestrial organisms that utilize the aquatic resources. Large open crowned trees and snags provide perching sites for eagles feeding on salmon along Tom Creek and Tom Lake. Riparian areas with poorly drained soils, skunk cabbage and dense understory provide primary nesting and brood rearing habitat for geese (Lebeda and Ratti 1983). Goslings use the cavities under large trees and dense understory vegetation for hiding cover (Lebeda and Ratti 1983). Nesting and moulting geese were found along Frank Creek. Moulting and nesting mallards, green-winged teal, red-breasted mergansers and red-throated loons were also found on Campbell Lake, Tom Lake, Tom Creek and some of the adjacent small lakes. There's some evidence that geese may be nesting in these areas as well. Nesting new gulls were found on a small high lake between Frank and Tom Creeks. Otters and bears use cavities under large trees and snags for resting and denning.

The riparian forest could provide nesting sites for harlequin ducks. Pairs of harlequins were seen in the marine zone during summer, suggesting breeding is possible. No young were seen however. The swift upper reaches of Tom and Campbell Creeks are the most likely places for harlequins to nest.

The Aquatic System

The aquatic system is comprised of streams, lakes, and ponds and the biota supported by these waterbodies. Aquatic ecosystems perform functions of particular importance to humans. The basic element of these systems is **water**, the foundation of life support. Water, and the minerals and nutrients it carries in solution, is drained and collected from surrounding hillslopes and transported and distributed by streams. Runoff is stored in lakes, ponds, and wetlands where release is regulated to varying degrees. Not only are nutrients in solution picked up and dropped off, but plant material ranging in size from spores to whole trees and sediment ranging from silt to small boulders are stored and redistributed as well.

The key habitat elements of the aquatic ecosystem are **water temperature, sediment, and large wood**. The general productivity of streams depends upon these basic elements. Water temperature regulates the general pace of activity and rate of production in aquatic ecosystems. Each aquatic organism has an optimal temperature or range of temperatures at which it grows and functions as well as thresholds at upper and lower extremes at which certain functions slow down or cease altogether. Extremes in water temperature are modified by water depth, tree canopy, and groundwater upwelling. Removal of any one of these elements increases the effects of the extremes.

Sediment and gravels provide a chamber for incubating fish eggs as well as habitat for aquatic insects, a trap for fine organic matter, and a site for nutrient spiraling. There is an optimal size of sediment for each family of organisms and life stage of an organism. Large wood has many functions in aquatic ecosystems. As a coarse structural element in flowing water, it traps and stores sediment upstream, and downstream it creates turbulence that provides cover for fish from above, scours sediment to create pools and clean gravels, and creates differences in water velocity for resting and food gathering. Wood provides cover for fish, a substrate for algae growth, a platform for aquatic insects, and source of carbon and other nutrients.

Aquatic Habitat Management Units (AHMU) are defined as geographically definable areas with distinctive resource values and characteristics that are comprised of the aquatic and riparian ecosystems, with a minimum width of at least 100 feet from all perennial streams and bodies of water.

Class I AHMUs contain streams and their associated riparian zones which support anadromous or adfluvial fish including habitat upstream from migration barriers known to be reasonable enhancement opportunities for anadromous fish.

Class II AHMUs contain streams and their associated riparian zones which support resident fish populations. These areas generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.

Class III AHMUs include streams and their associated riparian zones which do not support fish populations, but have potential water quality influence on the downstream aquatic habitat.

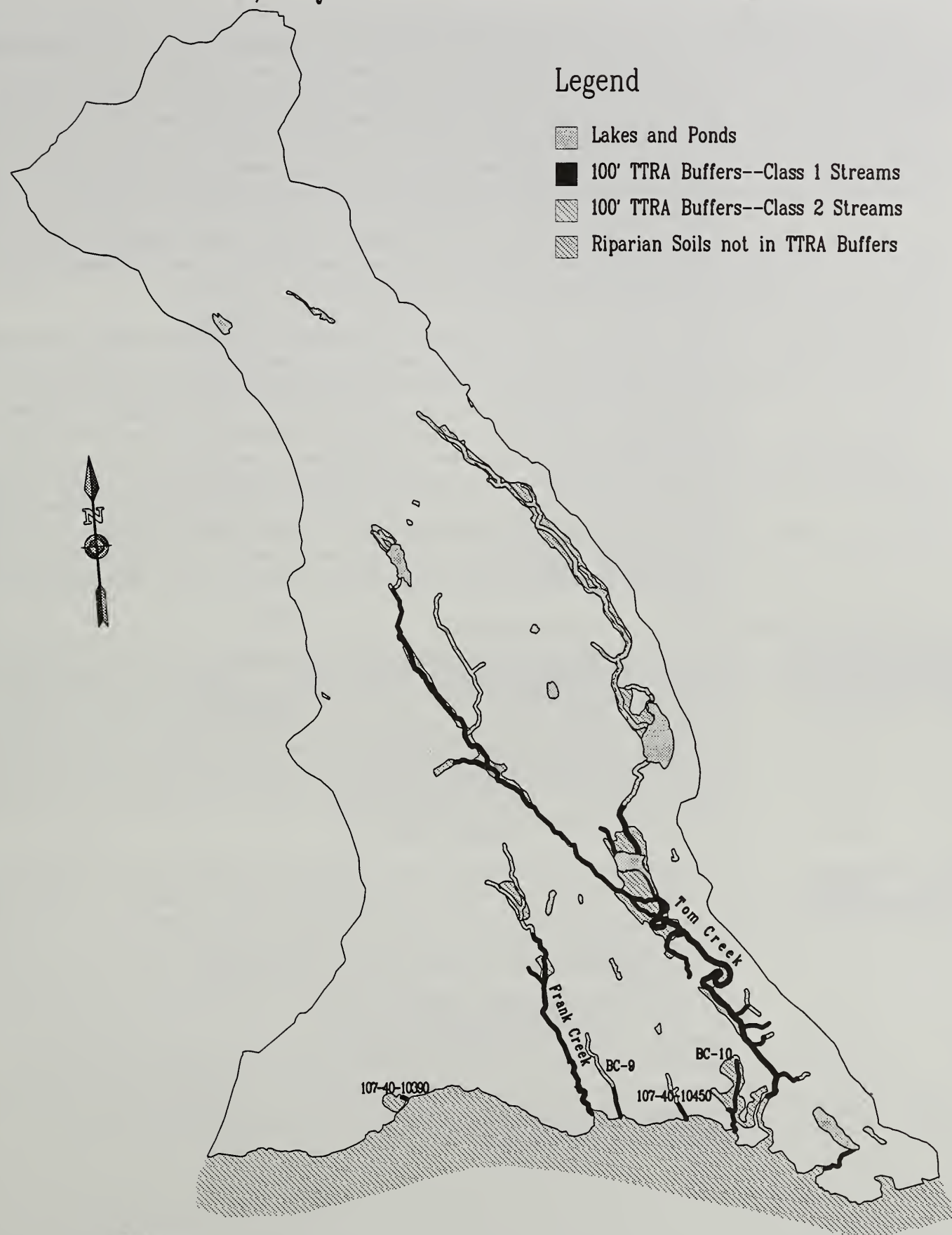
Class I and II streams are given special importance.

Class I (anadromous) and Class II (resident) AHMU are delineated in Figure 3-18. Comparison with Figure 3-17 shows that these ecological units are part of the more comprehensive Freshwater Influence Zone, which also includes Class III streams as well as wetlands. These Class I and II units are given special recognition due to their high water, fish, and wildlife values focused on by the TTRA.

3 Affected Environment

The boundaries of Class I AMH Units having **contained** channels, or incised channels confined by bedrock or armored by large boulders, coincide with the boundaries of the TTRA streamside buffer (100-foot minimum) because these channels are not likely to change course over time. Streamside vegetation plays a role in the contained stream energy budget, but not in channel configuration. Contained streams tend to be very stable.

FIG. 3-18, AQUATIC HABITAT MANAGEMENT UNITS



3 Affected Environment

Unconstrained channels are more productive and sensitive.

The boundaries of Class I AHMU's having **uncontained** channels, or channels located on floodplains or alluvial fans, coincide with valley walls or other hard features. These channels lack incision and are bounded by erodable, recently deposited sediments which have not had time to develop a thick organic layer. They tend to be confined almost entirely by streamside vegetation which is difficult to re-establish if the thin organic layer is removed mechanically or by floodwaters. Uncontained streams are responsive to natural events and land management activities, and are likely to change course over time due to their relative instability. Uncontained channels tend to be more productive than contained channels as long as their integrity is maintained. Larger streams, third-order and higher, tend to have a mix of contained and uncontained channel sections.

Stream channels on the Tongass National Forest have been classified and mapped using channel types--a physically based system which allows for comparing channels of similar form and function. A description of the physical characteristics and management considerations of the approximately 38 channel types is provided in A Channel Type User Guide for the Tongass National Forest, Southeast Alaska (R10-TP-26). Channel types have further been grouped by the stream processes which formed them, reflecting the long term interaction of geology, landform, climate, and resultant vegetation patterns. These process groups explain the basic interrelationships between the runoff, sediment transport, and vegetation patterns of channels so management guidelines and practices developed for each process group would consistently address the various management concerns of the different types of channels.

Streams are grouped according to the main management concern.

For timber sale project planning, process groups were further grouped according to two basic management concerns. These include: 1) streambank stability--alluvial channels on floodplains and fans, and some portions of mixed-control channels; and 2). sideslope stability--V-notches of varying depth and other channels where streambank stability is less of a concern. For the management purposes considered here, a sideslope is that length of ground from the bankfull channel to the first major slope break above bankfull. The distribution of inventoried streams in the watershed analysis area is given in Table 3-13.

Most streams are bedrock controlled.

The majority of the inventoried streams are in well-contained, bedrock channels (75 percent; see Table 3-13). These channels are managed for sideslope stability. Despite their bedrock nature, local areas of stream banks may be quite sensitive to disturbance. Since they are contained, most of these channels can route higher flood flows without overtopping their banks and easily transport silt, sand, and material the size of large cobbles. Many of the steep, contained channels on the study area are V-notches with steep, unstable side slopes. A number of these channels, particularly on the west side of the study area where steep mountain slopes extend from alpine to saltwater, lie in the brush-covered scars caused by episodic snow and debris avalanches. The upper reaches of the mainstems of Tom and Frank Creeks are also contained and bedrock controlled, but have more moderate gradients than the V-notches on the west face.

About 25% of streams are alluvial.

About 25% of streams are alluvial, dependent on riparian vegetation and woody debris for stability, and sensitive to stream bank, stream bed, and floodplain disturbance (Table 3-13). These channels include segments of Campbell Creek above Campbell Lake, Tom Creek downstream of Tom Lake, and on its northwest fork, and portions of Frank Creek. Annual flows (a frequency of once per year) may go over stream banks onto floodplains, fans, and terraces, with the opportunity to both scour backwater or side channels and deposit sediment and nutrients. At higher flows these streams will easily move large gravels, as well as sand and silt particles.

Tom Creek is contained in steep valley walls of sediments.

Lower Tom Creek, below Tom Lake, is unique in its structure. During its development, parts of Tom Creek cut deep into highly erosive, fine-textured sediments, instead of developing extensive floodplains. Floodplain and terrace development is now limited to localized areas within the incised valley. The valley walls have thus become unstable sideslopes adjacent to the mainstem of the channel. These formations are highly variable, however, and areas of floodplains with oxbows, low gradient alluvial fans, and freshwater meadows exist in close proximity to these incised stream reaches.

The mainstem of Frank Creek is another alluvial channel. It lies in a narrow valley which constricts floodplain development through local bedrock control points. Floodplains generally do not exceed a width equal to the width of the bankfull channel.

Table 3-13, Distribution of Channel Type Process Groups for All Watersheds.

Managed For	Process Group	Stream Length (mi)
Streambank Stability	1. Low Gradient Floodplain ¹	17.3
	2. Alluvial Fan	2.4
	3. Mixed Control Moderate Gradient ²	3.3
	7. Placid or Glide	0.6
	8. Estuary	0.7
	9. Glacial Outwash	0.4
		<hr/> 24.7 = 25% of stream length
Sideslope Stability	4. Large Low Gradient Contained	1.2
	5. Moderate Gradient Contained	2.7
	6. High Gradient Contained ³	71.5
		<hr/> 75.4 = 75% of stream length

3 Affected Environment

¹ **Low Gradient Floodplain** - These channels generally have a rich, abundant community of fish due to good spawning gravels and large wood for good rearing habitat.

² **Mixed Control Moderate Gradient** - These channels provide excellent rearing habitat due to large wood accumulations in the streams.

³ **High Gradient Contained** - These are the smaller, steep, bedrock channels either at high elevation or draining directly into salt water. Fish use of these streams or tributaries is very low.

Wildlife use of aquatic ecosystems.

The aquatic ecosystem provides habitat for anadromous and resident fishes that provides an important seasonal food source for bears, eagles and otters. Otters use the streams and lakes for travel as well as feeding on fish. Groups of geese were consistently seen at Campbell Lake, Tom Lake, and the lake east of the Tom Creek estuary. Campbell Lake in particular seems important for molting geese. The association of muskegs, sedge meadows and the lake provides visibility of predators, forage, and escape. Spotted frogs require lakes and ponds for portions of their life cycle. However, spotted frogs were not found during field surveys conducted in 1992.

Wetlands

Wetlands are defined as areas that are inundated by surface or groundwater enough to support vegetation adapted to wet soils. Wetlands generally include swamps, marshes, muskegs, and similar areas. Wetland delineation involves determination of soil, vegetation, and hydrologic indicators (USDA-FS, 1991). Wetlands store water, trap sediment, and store and recycle nutrients. Some of these nutrients are released from impoundment during heavy rainfall events and floods.

About 21% of the wetlands in the area are muskegs.

Like much of Southeast Alaska, the Campbell Area contains a large proportion of wetlands. They are found from sea level to alpine and are comprised mainly of muskegs (21% of wetlands) and alpine/subalpine (61% of wetlands) as well as smaller amounts of freshwater meadows and forested wetlands. Muskegs support unquantified populations of aquatic insects, amphibians, and waterfowl. Wetlands provide corridors, groundwater recharge, flood and sediment control, and water quality enhancement. The Forest Service, as well as other federal agencies, are required by Executive Order 11990 to preserve and enhance the natural and beneficial values of wetlands in carrying out their land management responsibilities. Estuarine wetlands mapped in the study area are small areas near the mouths of Tom and Frank Creeks. Although these intertidal sedge dominated communities are very small (only 27 total acres), they do have significant value as wildlife habitat (See Table 3-14). Approximately 30 percent of the study area is classified as wetland as defined by the Federal Manual for Identifying and Delineating Jurisdictional Wetlands, 1989.

Table 3-14, Distribution of Wetlands

Wetland Type	Acres
Muskeg	1,759
Freshwater Meadow	129
Estuaries	27
Forested Wetland	997
Alpine Wetland	5,150
Lakes and Ponds	304
Total	8,366
Percent of Area	30%

Muskegs provide travel-ways for wildlife and people.

While some components of the Freshwater-Influence Zone have high wildlife values, the low wildlife value muskegs result in a low overall rating of this zone for most of the management indicator species shown in Table 3-10. Muskegs have relatively low productivity and thus, are not as valuable for wildlife habitat as other areas or wetlands. However, the long strings of muskegs east of Tom and Frank Creeks provide easy travel routes and are well used by bears during summer and fall. A heavily used brown bear travel corridor linking the Tom Creek and Harding River drainages occurs primarily in this zone. In the densely forested landscape of Alaska, muskegs provide scenic relief and easier access for people too. Geese and brown bears feed on sedges and skunk cabbage in muskegs. The small muskeg ponds and pools may also provide habitat for amphibians.

The Upland Saltwater-Facing Zone

The Upland Saltwater-Facing Zone (See Figure 3-12) has the greatest potential for timber harvest in the study area. Although this zone only represents about 12% of the Campbell study area (VCU 510) it supports 50% of the suitable and accessible timber production area. Since it contains most of the potential harvest units, many of the planning issues are partially or wholly affected by the processes occurring in this zone. For example the effects of harvest on soil productivity and vegetation (See Planning Issue #7, Chapter 1). Large blocks of old growth habitat are presently located in this zone which affect species conservation issues (See Planning Issue #4, Chapter 1) and important south-facing habitats for goats (See Planning Issue #5, Chapter 1). By definition, most of this zone faces toward the Bradfield Canal and is seen by visitors to the area. Changes in the seen landscape affects the setting for some of the established uses in the Bradfield (See Planning Issue #8, Chapter 1).

3 Affected Environment

Habitat

By far, the predominant plant association in this zone is the western hemlock or western hemlock-Alaska cedar association (92% of the zone). This zone tends to be more productive due to the south-facing aspect which allows for greater light penetration and a longer season. This zone is also characterized by continuous old growth forest with numerous cliffs and rock outcrops. The forest in this zone connects the saltwater influence, upland interior and alpine zones and is frequently dissected by the freshwater influence zone. These characteristics and interactions with the other zones contribute to the importance of this zone to wildlife (See Table 3-10).

FIG. 3-19, GOAT WINTER RANGE



Mapscale 1:100000

1 0 1 2 Miles

Scale is 1 inch = 1.58 miles

3 Affected Environment

Cliff areas with cover are key to goat winter habitat.

Cliffs and rock outcrops embedded in the old growth forest on south facing slopes and adjacent to alpine summer range provide optimal goat winter habitat (Table 3-10 and Figure 3-19). Most of the cliffs along the West Face were field verified in 1991 and 1992. These surveys also confirmed the use of these cliffs and surrounding old growth forest by goats and deer.

The forest processes in this zone are much the same as in the saltwater influence zone with respect to bears, deer, marten and hairy woodpeckers. The main difference being that the higher elevation results in lower temperatures and increased snow loads. Thus, winter habitat values decrease with increasing elevation. The continuous forest cover provides unconstrained pathways for seasonal migrations from the lower elevation to the alpine zone for goats, deer and bear. Forested stands in this zone provide potential nesting habitat for marbled murrelets and goshawks as discussed in the saltwater influence zone.

Scenery

This zone is almost exclusively responsible for the perception that most of the visitors have of the study area. The timber producing lands and the seen area overlap creating a management challenge.

The Upland Interior Zone

This upland zone, shown in Figure 3-12, has substantially less area for potential timber production than the Saltwater Uplands (22% of the accessible, suitable lands in the study area) because forested areas become more fragmented and less productive away from saltwater. The potential timber producing lands also become harder to reach economically with a road/helicopter combination harvest system. Issues associated with this zone are similar to the Upland Saltwater-facing Zone but potential harvest is not as concentrated in this zone.

Habitat

In most respects this zone is similar to the upland saltwater-facing zone but differences in aspect and distance from saltwater result in colder temperatures and higher snow loads. Plant associations again consist of mainly the western hemlock or western hemlock-Alaska cedar types. There is an increase in the Mountain Hemlock association also. Generally, this zone has less value as winter habitat for the MIS species. However, high elevation old growth forests do provide denning habitat for brown bears. Although the average HSI values in this zone are relatively low, the large acreage makes it important to the total carrying capacity of the study area.

There is a substantial amount of goat winter habitat in this zone (Figure 3-19). In general, the increased snow levels in this zone should make these sites less valuable than those in the saltwater-facing uplands. The cliffs between Tom and Franks Creeks may be even less suitable because they are not associated with an alpine ridge system. This is because goats are not likely to travel far from their summer range (C. Smith, ADF&G, personal comm.).

The large blocks of old growth forest in this zone connect the saltwater facing forests with the adjacent Harding River watershed (Figure 3-6). However, the upland interior forest east of Frank Creek is highly fragmented by muskegs and sparsely forested riparian areas. Interior forest stands adjacent to the freshwater influence zone likely provide escape cover for Vancouver Canada geese broods (Lebeda and Ratti 1983). Forested stands in this zone provide potential nesting habitat for marbled murrelets and goshawks as discussed for the saltwater influence zone.

The Alpine/ Brushy Slope Zone

This zone is the largest and makes up about 40% of the study area. Even though timber harvest activities will not directly impact this zone, it is an important part of the ecology of the area. There are few issues directly associated with this zone except for helicopter flight guidelines near goats during the summer months.

Habitats

By definition the alpine zone includes the high altitude, nonforested lands. The high elevation results in a harsh climate of colder temperatures and heavy snowloads. This zone has a short growing season. There are three distinct vegetation types; herb/heath, brushy and scattered areas of small trees consisting mostly of mountain hemlock. The typical alpine vegetation consists of low growing herbs and heaths interspersed with unvegetated rock outcrops occurs between treeline and the perennial snowline. Brushy areas include alder dominated avalanche slopes and some sparse stands of mountain hemlock.

The avalanche and brushy slopes are important early spring feeding areas for bears and goats because the snow melts faster and the vegetation sprouts earlier than the surrounding forest. They follow the retreating snow line farther into the alpine to feed on freshly sprouting vegetation. Goats and deer remain in the alpine zone throughout the summer but bears may return to lower elevations to feed on fish and early berries.



Chapter 4

Environmental Effects

Chapter 4

Environmental Effects

Introduction

In this chapter we describe the effects of the seven alternatives on the environment through the ten key planning issues. This chapter is divided into two main sections:

Effects on the Key Planning Issues- We will describe the effects of each alternative on the ten key planning issues.

Other Environmental Considerations- In this section we discuss some of the other environmental considerations required by various laws.

Effects on the Key Planning Issues

The Council on Environmental Quality (CEQ) issues guidance to the Federal Agencies to determine the significant issues concerning any proposal and eliminate those issues which are not significant. With the help of the public and other agencies, we identified ten issues which were significant enough to be examined in detail given the nature of the proposed action. In this section, we describe the environmental effects associated with these ten issues.

Issue One: Freshwater System

This issue addresses the impacts that harvest and the transportation system could have on the productivity and function of the freshwater system. This issue deals directly with effects to the Freshwater Influence Zone described in Chapter 3. Direct and indirect effects to the important elements and processes in this zone are described.

Riparian Ecosystem

Impacts to wildlife in the Freshwater Influence Zone (FIZ) relate to changes in fish production potential and vegetation. Tom and Frank Creeks are the most important fish producing streams. Reductions in production potential resulting from management activities could reduce the availability of this important seasonal food source for bears, eagles and otters and other predators and scavengers. Thus, alternatives which impact fish productivity could also impact these wildlife species (see discussion on aquatic system below).

4 Environmental Effects

Buffers along Class I and II streams protect the most important riparian vegetation.

In all alternatives except D the Freshwater Influence Zone would have the least number of acres harvested of the zones that receive harvest (Table 4-1). Most of these acres harvested in all alternatives are along class 3 streams. Required TTRA buffers along class 1 and 2 streams should protect the most important vegetation components of the riparian system for bears, eagles, otters, and Vancouver Canada geese. The TLMPS DEIS states that there is believed to be a relationship between the amount of timber harvested in old growth and a reduction in Vancouver Canada goose nesting and brood rearing habitat capability. All nesting geese or evidence of their nesting has been found in the immediate vicinity of class 1 and 2 streams and lakes, within the TTRA buffers. No evidence of nesting has been found within any of the proposed units. Harlequin ducks may also nest in this zone. However, the ducks' most likely nesting areas are farther upstream along Tom and Campbell Creeks where harvest will not occur.

Table 4-1, Estimated Acres Harvested By Zone

Zones	A	B	D	E	F	G	P
FIZ	0	28	66	166	74	52	52
Upland Saltwater Facing	0	141	353	502	376	229	359
Upland Interior	0	115	14	216	115	115	65
Total	0	284	433	884	565	396	476

Alt. E has the most and Alt. D the least effect on bear corridors other than Alt A.

Riparian areas connect the different zones and provide travel corridors for wildlife within the study area. Bears and other wildlife use Tom and Frank Creeks and the muskegs that parallel them as travel corridors. All proposed roads would parallel these corridors and therefore impact their use by wildlife. Schoen and Beier (1990) reported a correlation between brown bear kill and cumulative length of road construction. Roads provide improved access and disturbance resulting in more legal and illegal hunting and defense of life and property kills. Alternative E, by roading in both drainages would have the most impacts. The road along Tom Creek would be particularly detrimental because of its location near a heavily used trail connecting the Tom Creek and Harding River drainages. Alternatives B, F, E and G all propose a road along Frank Creek and would have similar impacts to this watersheds' use by bears. Alternatives D and P would create the least impact with no roads. In order to protect bears, we would close all roads to motorized traffic. This would reduce but not eliminate impacts to bears and other species using these corridors because roads would still improve access for foot travelers.

All Alts. have minimal effects on floodplains.

The Executive Order 11988, dealing with floodplain management, was largely intended to reduce the risk of property loss, minimize the impact of floods on human safety, health and welfare; and to restore and preserve the beneficial values served by floodplains. None of the proposed alternatives would result in human occupancy of floodplains. Because the proposed action would have no floodplain development other than stream crossings and some timber harvest, there will be no anticipated loss of property values, nor will human health, safety, or welfare be adversely affected. In general, road location, construction measures, drainage structures, and timber harvest are expected to have only minimal effects on the natural or beneficial values of the floodplains.

Aquatic Ecosystem

The exact impacts of timber harvest and related road building on water quantity and quality are part of complex relationships with diverse watershed features. However, the following indicators allow for reasonable predictions of the adverse risk to a watershed, stream and water quality:

1. The length of stream channels near harvest units (within about 100 feet) that have banks and/or sideslopes which are sensitive or susceptible to damage.
2. The number, length and type of roads built, and the number of stream crossings required.
3. The proportion of area harvested in a watershed, with consideration given to its overall "sensitivity" based on factors including soil erodibility, stream stability, and drainage density.
4. Mitigation measures applied, including Best Management Practices (BMPs), Forest Plan guidelines, and site specific prescriptions.

Alt E poses the greatest risk to water quality.

Length of Affected Stream Channels- Risk of water quality degradation increases with the amount of near-stream harvest. The risk is greater where both sides of a channel are affected. Buffers, when implemented to protect sensitive banks and riparian areas, reduce this risk considerably. However, streams are at risk to increased sedimentation if the buffer blows down. Table 4-2 summarizes stream lengths that would be potentially impacted by harvesting units near streams in a given alternative. Data are expressed in terms of the management concerns mentioned in Chapter 3; **sideslope stability** (V-notches and areas where streambank composition minimizes bank stability concerns) and **streambank stability** (alluvial channels and similar areas where most but not all buffer strips may be implemented). Data are also differentiated by whether harvest units would occur on one or both sides of a channel. In terms of overall affected stream length, streams would be subjected to the greatest risk by alternative E, where 4.4 miles of stream would be within about 100 feet of a harvest unit. Following, in decreasing order, alternatives G (3.2 miles), F (2.9 miles), P (2.6 miles), D (2.2 miles), B (1.3 miles), and A (0 miles) would have less impacts. The actual streamside harvest is difficult to predict under Alternative G due to the random nature of group selection harvest. The estimate given (3.2 miles) assumes the worst-case scenario but actual impacts are expected to be intermediate to Alternative F and B.

Table 4-2, Length of Stream in or near Proposed Harvest Units

Management Concern		Length of Streams Near Units (Miles)						
With harvest units on:	ALT A	ALT B	ALT D	ALT E	ALT F	ALT G	ALT P	
STREAM BANKS								
One side of stream	0	0.1	0	0.2	0.1	0.1	0.1	
Both sides of stream	<u>0</u>	<u>0</u>	<u>0</u>	<u>0.2</u>	<u>0</u>	<u>0</u>	<u>0</u>	
Subtotals:	0 (0%)	0.1 (<1%)	0 (<1%)	0.4 (<1%)	0.1 (<1%)	0.1 (<1%)	0.1 (<1%)	
SIDE SLOPES (including V-notches)								
One side of stream	0	0.3	0.4	0.9	0.5	0.5	0.5	
Both sides of stream	<u>0</u>	<u>0.9</u>	<u>1.8</u>	<u>3.1</u>	<u>2.3</u>	<u>2.6</u>	<u>2.0</u>	
Subtotals:	0 (0%)	1.2 (2%)	2.2 (3%)	4.0 (5%)	2.8 (4%)	3.1 (4%)	2.5 (3%)	
OVERALL (stream banks plus side slopes)								
One side of stream	0	0.4	0.4	1.1	0.6	0.6	0.6	
Both sides of stream	<u>0</u>	<u>0.9</u>	<u>1.8</u>	<u>3.3</u>	<u>2.3</u>	<u>2.6</u>	<u>2.0</u>	
Totals:	0 (0%)	1.3 (1%)	2.2 (2%)	4.4 (4%)	2.9 (3%)	3.2 (3%)	2.6 (3%)	

Alt. E has the most stream crossings, Alt A and D none.

Stream Crossings- Other factors being equal, the greater the total road length, the higher the risk of water quality degradation. Alternative E would require the most construction of roads (4.6 miles), and 6 stream crossings. Alternatives B,F and G with 1.3 miles of road and 2 stream crossings. Alternatives D, P, and A have no stream crossings. Most of the roads proposed for construction lie on stable landforms away from streams. Differences in the risk to water quality among alternatives is considered minimal since the roads are planned primarily to access routes to helicopter landings and are not generally located on high-risk terrain.

Cumulative Effects on Water Quality- The cumulative effect of harvest units and roads on streams includes the additive effect of stream lengths and crossings from all proposed, existing and foreseeable actions. The Campbell study area is somewhat unique in that there are no existing roads or units in the project area and there are no further roads planned in the future other than those pictured in Alternative E. It is unlikely that there will be harvest exceeding that pictured in Alternative E through the first fifty years of the harvest rotation. Furthermore, Campbell study area is the only VCU scheduled for timber harvest on the north side of the Bradfield Canal.

Cumulative effects on water quality will be less than risk of this entry.

We would also close all roads under all alternatives, remove drainage structures, construct water bars across the road, and revegetate disturbed areas. Natural reclamation by alder (*Alnus* spp.) is also likely and will help reduce sediment movement away from the road prism. Consequently, the risk of cumulative long term effects is considered less than the risk of initial, short term effects associated with construction and hauling.

Cumulative Proportion of Area Harvested by Watershed Sensitivity- McCorison, et. al. (1988) developed a model to determine relative sensitivities of watersheds in Southeast Alaska. These sensitivities were used in conjunction with beneficial use indices to estimate watershed harvest thresholds of concern. Harvest near or over the threshold indicates increased risk of water quality degradation. Factors considered in this model include drainage densities, average channel stabilities of various channel types, erodibility of the various soils encountered, and an index of beneficial use values.

This model first assigns to each watershed one of four corresponding sensitivity classes. Then the model considers the beneficial uses of the various streams and the sensitivity of their respective watersheds before assigning each watershed a recommended maximum harvest area. This percentage of the total watershed area is referred to as a watershed's threshold of concern (TOC).

Cumulative harvest levels are well below the threshold of concern.

When run on the watersheds in the Campbell study area, the results indicated that most would contain cumulative harvest levels well below their threshold of concern. Examples are found in Table 4-3. Watersheds are referred to by their Alaska Fish & Game Catalog number and can be referenced using Figures 3-4 and 3-18 in Chapter 3.

Table 4-3. Examples of Watershed Thresholds of Concern and Harvest Percentages.

Stream/Watershed	TOC	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt P
Tom Creek, A30 (All Watersheds)	20%	0%	0%	<1%	1%	0%	0%	0%
Frank Creek, A27A	50%	0%	5%	1%	5%	5%	5%	3%
Miner's Creek, A24A #107-40-10390	5%	0%	0%	1%	1%	1%	1%	1%
Watershed AD2A #BC-10	80%	0%	41%	10%	41%	41%	41%	41%
Hollywood Creek, A28A #107-40-10450	70%	0%	13%	13%	13%	13%	13%	13%

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Specific BMP's we will follow are referenced in Appendix A and Table 4-4.

Mitigation Measures- Aquatic Habitat Management Unit (AHMU; see Chapter 3, Fisheries) guidelines will be followed, and regional Best Management Practices (BMPs) implemented and monitored. Site specific implementation of the BMP's has been referenced on the unit and road cards and in Table 4-4 below. These measures should minimize the short term effects on runoff processes and sediment production and transport. Such measures include site specific use of vegetated streamside buffer strips, full or partial suspension of logs when yarding across streams (inherent with helicopter yarding), "split-lined" harvest settings (streambanks used as boundaries), and minimizing small woody debris "loading" in stream channels. Successful implementation of BMP's, as part of our Memorandum of Agreement with the State of Alaska, satisfies State and Federal nonpoint source pollution requirements.

Fish Habitat- As discussed in Chapter 3, salmon habitats are products of the geology and soils, topography, vegetation, climate, and hydrology of a watershed. Changes in these conditions can bring about changes in habitats which, in turn, can greatly affect fish production. Land use activities can amplify natural events by removing some of the natural buffering mechanisms which are part of natural processes.

Studies have shown that natural environmental conditions can cause unmanipulated fish populations to vary as much as fifty percent from year to year. Specific cause-and-effect relationships between management activities and populations are clouded by changes in the environment. Some impacts can be naturally mitigated while others can be compounded.

In spite of the complexity of cause-and-effect relationships involved in fluctuations of salmon populations, certain land management practices are known to increase the risk of impairing habitats. BMPs have been jointly developed by the Alaska Department of Environmental Conservation (ADEC) and the Forest Service in response to the requirements of the Clean Water Act. Table 4-4 summarizes the relationship between the desired future condition of elements of fish habitat, risk factors, and BMPs associated with those risk factors and desired conditions. Streamside buffers, drainage structures, and timing windows are the primary practices used to avoid impacts to fish habitat.

100 foot or greater buffers will protect fish habitat and floodplains.

Streamside Buffers- We would protect Class I fish streams and their Class II tributaries with a 100-ft. minimum no-harvest streamside buffer as required by the Tongass Timber Reform Act (TTRA). Where sensitive hydric soils, such as alluvial fans and floodplains, occur past the 100-ft. minimum, we would extend the buffer to include these areas in order to protect the landform.

Stream Crossings- We would install drainage structures such as culverts which fit the streamflow and fish habitat conditions to protect water quality and fish habitat. We would also observe timing windows for installation to further protect water quality and fish habitat from sediment during critical periods.

Alt E would have the greatest risk to fish habitat.

Figure 4-1 provides a summary comparison of relative risk to fish habitat posed by implementation of the action alternatives. Alternative E would present the greatest potential to impact fish habitat because it would harvest the most acreage adjacent streams, yard the most timber volume by both helicopter and ground-lead cable systems, and construct the most road involving the greatest number of stream crossings.

Alt A and D would have the least risk to fish habitat.

Alternatives D and P would present the least risk to fish habitat because they would construct no road, would require no stream crossings by road, would harvest an intermediate amount of acreage adjacent to streams, and would not include any ground-lead cable yarding. Alternatives B, F, and G would be intermediate between Alternatives E and D, and would be virtually equal in potential for impact with Alternative F harvesting slightly more helicopter volume than B or G.

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Table 4-4. Summary of Relationship of BMP's to Desired Conditions and Potential Impact

Desired Condition	Undesired Condition	Potential Impact	Impact Mechanism	Prevention Practices	Associated BMP's
barrier-free access	isolated,unutilized habitat	passage blocked	perched culvert; plugged culvert; excessive velocity dewatered channel; slash, road fill	structure installation structure maintenance timing window; streamside buffer	13.16 14.15 thru 14.16 14.17 thru 14.19 12.6 thru 13.3
stable spawning gravels, natural pool-riffle ratio	displacement of egg/sac fry; filling of pools	destablization of streambed	removal of large wood	streamside buffer; restrict instream operations	12.6 thru 13.8 13.16 thru 14.13 14.14 thru 14.16
clean spawning gravels	embedded spawning gravels	siltation of spawning gravels	erosion of roads exposed soils	erosion and sediment prevention and control	13.1 thru 13.14 13.16 14.1 thru 14.25
healthy eggs and sac-fry	unnecessary egg and sac-fry mortality	mechanical injury	equipment in streams	timing window	14.6 thru 14.10 14.14 thru 14.16
stable alluvial fans and floodplains with narrow, deep channels energy concentrated	unstable alluvial soils with broad & shallow or braided channels; energy dispersed	destabilization of streambanks; loss of soil productivity	removal of large wood and thin organic layer	reparian area buffer; streamside buffer; full suspension yarding; streambank and channel protection	12.6 thru 13.3 13.8 thru 13.19 13.9 12.7 thru 13.16 14.2 thru 14.15 14.17 thru 14.18
adequate cover from predators, high flows	reduction or lack of cover, refuge	loss or displacement of fish	removal or displacement of large wood; damaged stream- banks	streamside buffer; restrict use of equipment in stream; full suspension yarding	12.6 thru 12.7 13.1 thru 13.2 13.3 thru 13.16 14.14 13.9

Table 4-4. Summary of Relationship of BMP's to Desired Conditions and Potential Impact (continued)

Desired Condition	Undesired Condition	Potential Impact	Impact Mechanism	Prevention Practices	Associated BMP's
optimal thermal protection	increases in temp extremes	a metabolic processes due to elevated temps & interstitial freezing	removal of shade & insulation mechanisms. (veg.)	buffer, especially on E-W orientations & lower gradient systems	12.6 12.6a 13.2 13.3
optimal oxygen supply	oxygen related fish kills	increased oxygen demand	decomposition of in-stream slash; increased temp. effects	prevent intro. of slash; removal of excessive slash if introduced	13.3 13.16
nutrient sources for primary, secondary biological production	loss of productivity	reduced populations	interruption of nutrient cycles; loss of inputs	streamside buffer streambank protection	12.6 thru 12.7 13.3 thru 13.16

Figure 4-1, Comparative Figure of Relative Risk to Fish Habitat

[illegible]

Figure 4-1 bar charts illustrate the **relative** differences in risk levels to the complexity of fish habitat and, hence, its production potential. Alternative A would have no additional effects, therefore no letters are shown. Each letter in the first chart represents an equivalent number of clearcut acres. For comparison purposes only, each harvest acre was "converted" into a clearcut. For example, 1 acre of Overstory Removal represents < 1 acre of clearcut depending on the diameter limit proposed. The levels of relative risk presented by the number of stream crossings, length of road and length of buffered and unbuffered streamside harvest in Class 1 watersheds are also shown.

Increased taking of fish could occur as an indirect result of harvest.

Human Influence on Fish Populations- Although not usually associated with habitat capability, fish stocks themselves are part of the structure and functional processes of the freshwater influence zone. Reduction in escapement by interception can reduce stream productivity over time due to the loss of fish carcasses (nutrients) in the aquatic and riparian systems. Continued reduction in escapement can also result in low use numbers, making the local population more vulnerable to extinction by an environmental event. Although fishing is not regulated by the Forest Service, the various alternatives would have potential for adverse impacts resulting from increased fishing opportunities.

Patterns of human use of fish resources in the study area would change with implementation of any of the action alternatives just from the short-term but intensive occupation of the area before and during logging. Levels of risk associated with interception through fishing are governed by the timing and duration of activities and the size of the human population associated with the harvest activity. Recovery to pre-harvest conditions depends upon the level of fishing, harvest re-entry frequency, and the environmental conditions following the end of harvest activity.

Increased fishing could compound Alt E effects to fish populations.

Indicators of relative risk to fish escapement presented by human occupation with this initial entry include sale size and total miles of road. These two indicators best reflect the amount of risk to fish populations from fishing pressure. These two indicators are factored into Table 4-1. Again, Alternative E would present the greatest risk because it would entail harvesting the greatest volume from the greatest area, and involve the most road construction. There is the greatest intensity or duration of human occupation of the study area. Alternative D and then P would pose the least risk to fish escapement and associated nutrient levels because they would harvest low volume and would require no road construction, reducing time needed to complete initial entry and potential access. Alternatives B, F, and G would be intermediate to Alternatives E and D.

Wetlands Ecosystem

Alts E and G affect the greatest amount of forested wetlands.

Standard protection for wetlands includes prudent road location and drainage structure installation. We would apply BMP's to protect the water storage and nutrient cycling functions of these areas.

Since a large amount (about 30 percent) of the study area is classified as wetlands, they are not considered a scarce resource. Values associated with these wetlands vary greatly depending on the type of wetland, proximity to water bodies, landscape position, etc. Alternatives were designed to minimize potential impacts to identified high value areas rather than to avoid development on all areas classified as wetland.

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The potential impact to wetlands is indicated by the amount of forested wetlands proposed for harvest (Table 4-5), and the amount of specified road proposed to be built on areas classified as wetland (Table 4-6). Alternative E would harvest the greatest amount of forested wetlands, followed by Alternative G and Alternatives B and F. Alternatives A, D and P have no effects to wetlands.

Table 4-5, Harvest of Forested Wetlands.

	No Action	Alt B	Alt D	Alt E	Alt F	Alt G	Alt P
Acres	0	6	0	33	6	26	0

The wetland vegetation, soil drainage or hydric character of a wetland will not be measurably altered by road construction except for the width of the roadfill itself. This is normally about 24 feet wide and amounts to approximately 2.9 acres per mile. Alternative D has no road construction. Alternatives B, F and G impact less wetlands with roads than Alternative E.

Table 4-6, Specified Road on Wetlands

Roads on Wetlands	No Action	Alt B	Alt D	Alt E	Alt F	Alt G	Alt P
Miles of Road	0	.9	0	3.0	.9	.9	0
Acres Covered	0	2.6	0	8.7	2.6	2.6	0

Issue Two: Beach Habitat

This issue concerns the effects of the transportation system on the productivity and function of the beach habitats. This issue is directly tied to the Saltwater Influence Zone described in Chapter 3.

Alternatives B, P and D propose only one LTF.

There is no timber harvest planned under any alternative for the Saltwater Influence Zone (SIZ) except for that which is needed to operate the transfer facility. Thus, the only habitat alteration would be associated with LTF's, rock pits and roads. Alternative A would have no effect on beach areas. Alternatives D, B and P with one LTF each would have the least impacts. Alternative B would have greater impacts than Alternative D or P because the beach area adjacent to Frank Creek estuary has more value to wildlife than the beach area on the west face. Alternatives F and G with 2 LTF's would be intermediate and alternative E with 3 LTF's would have the most impact.

LTF's were selected with the least effects on the SIZ.

In evaluating sites for LTF's and roads, several wildlife and fisheries considerations were taken into account. We avoided locations with eagle nest trees and avoided the mouths of streams and estuaries as much as possible. LTF's would be rehabilitated after the sale which could provide additional meadow areas for early spring foraging by wildlife. LTF sites should be replanted with native species. Sort yards were located in the uplands except at the West Face site. We placed beach fringe roads in the forest to minimize disturbance to sedge meadows because this habitat type has high value and limited acreage in the study area. Clearing widths for roads and flight corridors (West LTF Site only) will be minimized.

Higher volume Alts will have the longest and most extensive human presence.

Human presence and activities such as helicopter yarding and boat traffic will disturb species that use the immediate beach fringe area such as otters, bears, bald eagles, geese and migratory waterfowl and shorebirds. If an action alternative is selected, restrictions on timing and location of helicopter yarding and blasting near eagle nest trees will follow the Interagency Agreement between the Forest Service and Fish and Wildlife Service for bald eagle habitat management. Specifically, we would not allow repeated helicopter flights within 1/4 mile of active nests and no blasting within 1/2 mile of active nests without written concurrence of the Fish and Wildlife Service. Repeated boating activities within 1/4 of a mile of active nests would also be minimized. Timing restrictions at the most heavily used areas (eg, Tom Creek estuary) during the most critical time periods (eg, early spring) may also be needed. Regardless of these mitigation measures some displacement of wildlife during harvest activities would occur.

Assuming a relationship between the total harvest and the intensity/duration of activities and the location of this disturbance adjacent to LTF sites, Alternative E would have the greatest impacts to wildlife and their use of beach areas, followed by F, P and G. Alternative B and D would cause the least amount of displacement of the action alternatives. Alternative A would cause no displacement.

Issue Three: Marine System

This issue concerns the effects of different methods and locations of log entry on marine fish and shellfish productivity. This issue describes the effects to the Marine Zone described in Chapter 3.

The Marine Zone has the potential to be impacted by log handling and storage as well as floating camp facilities. Log handling is comprised of four phases: 1) dumping; 2) booming/rafting; 3) storage; and 4) transport. The potential for impact by these operations is discussed by the three areas of the zone (intertidal, subtidal, and offshore) described in Chapter 3, Affected Environment. Although other agencies have jurisdiction over permitting such activities in this zone, discussion here focuses on the relative risk to the marine environment presented by the range of action alternatives.

Analysis revealed that, due to the combination of natural conditions governing stand suitability, terrain accessibility and environmental constraints, a total of three possible LTFs will be required to accommodate the range of action alternatives. The locations of these facilities are depicted in the alternative maps in Chapter 2. The West Face Site may not be needed if the operator elects to use a barge to drop logs on. This option would have less impacts to the marine ecosystem. However, in order to display the most potential impacts that could occur, we assumed that all the action alternatives except B would require the use of the West Site.

The best LTF site is not located near the best timber harvest opportunities.

Siting of the log transfer and raft storage facilities is the single most important means of controlling adverse impacts to the Marine Zone. Table 4-7 provides a summary comparison of how well each log transfer/rafting facility meets siting guidelines developed by the Alaska Timber Task Force. These guidelines are included in the Best Management Practice which addresses location and design of LTF's. When evaluating proposals for log transfer and associated facilities, the objective is to consider all the guidelines and develop the "best mix" which allows the activities to proceed while meeting all applicable statutory and regulatory requirements.

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Most risk of environmental impact is associated with the intertidal areas and the subtidal areas (subtidal areas lie between intertidal and offshore areas). Potential impacts include 1) occupancy of habitat by shot rock and other materials used to construct facilities, 2) occupancy of habitat by accumulations of bark, 3) local chemical pollution from wood leachates and decomposition products from bark accumulations, 4) shading associated with rafting and raft storage, 5) compaction associated with grounding of logs/log bundles.

The degree of these potential impacts at any one site depend upon a number of variables: 1) duration of activity, 2) volume of timber to be handled, 3) slope of intertidal and subtidal areas, 4) substrate/bottom composition of intertidal and subtidal areas, 5) current for dispersal, and 6) water depth. A description of the physical and biological characteristics of the alternative LTF sites is contained in dive reports presented in Appendix E.

Intertidal and Subtidal Areas

Shotrock ramps, the primary component of all the potential LTFs, would extend from above the high tide line down through the intertidal area to the lowest low tide mark. This material would cover the existing intertidal areas and would create a different, simpler habitat due to its grain size, composition, and slope. To marine life, this modified habitat would more resemble a fractured rock outcrop in the middle of a cobble, sand, and gravel beaches.

Of three LTF's, the West Face Site has intermediate effects on marine areas.

West Face. This site could dewater and water up to 11.6 million board feet under Alternative P, 10.5 in Alternative D, 7.1 MMBF in Alternative F and E and almost 3 MMBF under Alternative G. This site would be the only LTF with a three acre sort yard as an integral part of the LTF itself. Branches, slabs, and culls would be burned at the sort yard. This site may be required in order to implement all the action alternatives except Alternative B.

This site would be located on an alluvial fan bordered by a Class I stream (107-40-10390) flowing along the eastern side of the fan. Due to the steep slope of the alluvial fan and, hence, the gradient of the creek, fish use of the marginal habitat is very low and the transition from freshwater to saltwater is a very abrupt one. There are no mudflats, sandflats, or grassflats to create a diverse estuarine condition. Although the site does not meet the S1 guideline (Proximity to Rearing and Spawning Areas), it does not appear this site possesses the estuarine and species characteristics the guideline was developed to protect. The site is near the westerly edge of an extensively used commercial shellfishing area that is deemed to be a moderately productive area.

The site has the potential to transfer the greatest amount of timber volume. The site offers steep intertidal and subtidal slope, deep water, the coarse substrate, proximity to current, and moderate biological productivity. It would present risk to biological productivity and displacement of commercial shellfishing operations that would be intermediate between the Frank Creek and Tom Creek sites.

The Frank LTF is the most strategic, but presents the greatest risk.

Frank Creek. This site would water approximately 7.0 million board feet of timber under all action alternatives except Alternatives D and P. This site would require a road for a short distance along the beach from a proposed rock quarry site adjacent a Class I stream (DC-9) to the west. Branches, slabs, and culls would be disposed of by burning at the upland sortyard site.

The intertidal and subtidal zone is the most extensive of the three sites and is associated with a productive subtidal intensively area used for commercial shellfishing. The site is associated with a small island which is connected to shore by an intertidal area. The lack of strong currents has contributed to the development of this shallow area of fine substrate. Although the site is more than 300 feet from a Class I stream, the shallow inter- and subtidal areas provide important saltwater rearing areas for smolts. To move the site to the west would impact the small estuary of the Class I fish stream. To relocate the site further to the east would increase impacts associated with biological productivity and commercial shellfishing. The potential for adverse impacts would be reduced to the greatest extent practicable by siting this LTF near the island where good water depth and current begins.

The Frank Creek site would transfer and ammount of timber volume intermediate to the Tom Creek and West Face sites. This site possesses the most gradual slope, the shallowest water, the least current, the finest substrate, the greatest biological productivity, and the most commercial fishing use among the potential LTF sites. Of the three sites, this site would present the greatest risk to biological productivity and would create the most displacement of commercial shellfishing operations.

The Tom Creek site possesses the best mix of meeting siting guidelines.

Tom Creek. This site would water approximately 6.5 million board feet under Alternative E only. Branches, slabs, and culls would be disposed of by burning at the upland sortyard site.

This site would be adjacent a Class II stream (BC-12). The intertidal zone is short, steep, comprised of coarse substrate, and abruptly drops to depth. The subtidal substrate is composed of rubble and bedrock. Because of proximity to steep bedrock bluffs that extend to depth associated with a constriction in the Bradfield Canal, current is stronger than the Frank Creek and West Face sites. This site is deemed to be the least productive of the potential LTF sites and is not known to be fished commercially.

The Tom Creek site would transfer the least amount of timber volume (6.5 MMBF). This site has the steepest slope, coarsest substrate, greatest water depth, proximity to the strongest current, and least biological productivity and commercial use of the potential LTF sites. Of the three sites, it would pose the least potential for adverse impact on commercial shellfishing operations and biological productivity.

Table 4-7, Summary Comparison of LTF Sites and Siting Guidelines

Siting Guidelines	West Site LTF	Frank Cr.LTF	Tom Cr.LTF
Greater than 300 ft. from mouths of Class I fish streams or important fish spawning and rearing areas.	No	No	Yes
5-acre minimum of weather-protected waters	Yes	No	No
Proximity to minimum 5 acres of relatively flat uplands.	Yes	Yes	Yes

Table 4-7, Summary Comparison of LTF Sites and Siting Guidelines (continued)

Siting Guidelines	West Site LTF	Frank Cr.LTF	Tom Cr.LTF
Safe road gradient from uplands facilities.	Yes	Yes	Yes
Adjacent strong tidal currents.	Yes	Yes	Yes
Away from productive intertidal and subtidal zones.	Yes	No	Yes
Away from shallow, productive habitats (extensive tideflats, salt marshes, kelp/eelgrass beds, seaweed harvest areas, shellfish concentration areas)	Yes	No	Yes
Safe marine access to facilities for tugboats	Yes	Yes	Yes
Minimum depth of 40 feet or deeper measured at Mean Lower Low Water	Yes	No	Yes
330-foot minimum distance away from eagle nest trees.	Yes	Yes	Yes
Avoid small craft boat anchorages and use areas.	Yes	No	Yes
Minimize effects of earthquakes	No	No	Yes

The anticipated degree of impact presented by alternatives as they relate to associated LTF siting is displayed in increasing order of impact:

* **Alternative A** would have no risk to the commercial fishery or the productivity of the Marine Zone.

* **Alternative D** would have the least effects of all action alternatives since it avoids the Frank Creek (most sensitive) site and only requires the West Site.

* **Alternative P** would have slightly greater impact than Alternative D since it would transfer 1.1 MMBF more timber volume over the West Site.

* **Alternative B** would have the next greatest impact to productivity.

* **Alternatives F and G** have greater impacts than D and B because they require two LTF's including the Frank Creek (most sensitive) site. However, both these alternatives handle less volume at the West Site than Alternative D.

* **Alternative E** would have the most impact to marine productivity since it would employ all three sites, but it is not expected to be that much more than Alternative F since the Tom Creek LTF site best meets the ATTF guidelines.

The degree of impact reflected by timber volume (MMBF) to site are compared by alternative and by site:

West- (D- 10.5),(E & F- 7.0), (G- 2.7), (P- 11.6),

Frank- (B, E & F- 7.0)

Tom- (E- 6.5)

Offshore Zone

Potential impacts to the offshore zone would include reduction in light penetration for photosynthesis under the rafts, bark accumulations, and minor chemical pollution associated with motorized vessels. These risks would likely vary not only by volume over the LFT site but, more importantly, by site sensitivity to disruption of biological production. Those alternatives which would use the Frank Creek site would create the greatest potential impact, whereas those which use the Tom Creek site would pose the least risk. Impact to offshore areas associated with the West Face site would be intermediate.

There are two options to harvest the West Face; development of LTF or use of barges.

A potential operator would have two options for harvesting the area along the West Face under Alternatives D, E, F, G and P. Alternative B does not harvest the West Face. Operators could construct the West Face LTF and drop logs directly into saltwater rafts, tow them to the LTF, take them to the sort yard, remove the remaining limbs water and raft them again so that tugboats can take them to a scale yard. The second option is to drop logs directly into the water or on to a barge and use the barges as the platform for limbing and chipping. Logs could then be taken to the scale yard by barge or by rafting the logs again and using tugboats.

Direct water drops would increase traffic in the Canal; Alt P would have the most impact.

Direct dropping of logs into the saltwater by helicopter would occur in offshore areas. Deep areas (>60 feet) would be chosen for drops so that logs would not become embedded in the bottom and debris would disperse with the current. More logs could be potentially dropped into saltwater under Alternative P and D and less with Alternative G. Alternatives F and E would have almost the same volume of logs for direct water drops. Alternative B would and A would have no water drops. Floating debris generated by water drops would be contained in the encircling bag created by the boom logs in order to keep from creating water hazards to traffic.

If barges are used there may be three to five traveling to and from the site.

The amount of barge traffic would increase under the second option for handling logs on barges. Although impacts to the intertidal and beach areas would be less, traffic and debris in the off-shore areas would increase if an operator chose to use barges as sortyard areas as opposed to constructing the West LTF Site. Using barges to harvest the West Face could require approximately three to five barges in the canal operating intermittently. Again Alternative P and D, have the most volume of logs and would require the most barges and time to harvest the area (11.6 MMBF and 10.5 MMBF). Alternative G would require less barges and they would not be needed as long (3 MMBF). Alternatives E and F would harvest the same amount off the West Face and require the same time (7.0 MMBF). Alternatives A and B would not require any barges be used.

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Two to three tugs may also be needed.

The number of tugs used would likely remain constant under all action alternatives unless an operator chose to use barges to haul logs to the scale yard. We estimate that two or three tugs may be required to transport logs intermittently. The duration of occupancy of the area would vary among alternatives and would be proportional to the volume harvested.

Issue Four: Species Conservation

This issue addresses the effects of harvest on species conservation and biodiversity.

Management Indicator Species (MIS)

A note about Habitat Capability Models- Habitat Capability Models utilize research results and best professional judgement of biologists from different agencies (USFS, ADF&G, USFWS) to relate characteristics of the vegetation (habitat) on a site to that site's capability to support a population of animals. These models are simple and cannot include all relationships that affect the number of animals that actually exist on that land. Therefore, they cannot be and are not meant to be an estimate of actual wildlife numbers. Their intended use is as a guide to predict relative impacts associated with management activities.

In addition to habitat disturbance through harvest, roads associated with development activities allow improved access for hunters and trappers. This is of greatest concern for bears and furbearers. This concern is discussed with respect to brown bears in issue 6. The same mitigations for brown bear should also protect furbearers to the maximum extent possible.

Alternative E has the greatest effects on all species, Alts A, B have the least effects.

Table 4-8 shows the percentage of original habitat capability and rank of potential impact by alternative for brown bear, deer, goat, hairy woodpecker and marten. Alternative E has the greatest impact to all species. Considering all MIS, the alternatives ordered by increasing impact are A, B, D & P, G, F, and E.

Table 4-8, Percent Habitat Capability & Rank of Impacts to MIS by Alternative

Species	Alt.	% of original Habitat Capability	Est. Habitat, Capability (#animals)	Rank
Brown Bear	A	100	9.1	1
	B	98	8.9	3
	D	99	9.0	2
	E	96	8.7	7
	F	97	8.8	6
	G	98	8.9	3
	P	98	8.9	3

Table 4-8, Percent Habitat Capability & Rank of Impacts to MIS by Alternative (continued)

Species	Alt.	% of original Habitat Capability	Est. Habitat, Capability (#animals)	Rank
Deer	A	100	586	1
	B	96	573	2
	D	95	568	3
	E	92	548	7
	F	94	560	6
	G	95	569	3
	P	96	565	5
Goat	A	100	52.4	1
	B	98	51.3	2
	D	95	49.9	3
	E	93	48.7	7
	F	94	49.0	6
	G	94	49.1	6
	P	95	49.9	3
Woodpecker	A	100	247	1
	B	97	240	2
	D	96	236	4
	E	91	225	7
	F	95	232	6
	G	96	238	3
	P	96	236	4
Marten	A	100	46	1
	B	98	45	2
	D	96	44	3
	E	91	42	7
	F	96	44	3
	G	96	44	3
	P	96	44	3

*Rank: 1=least impact 6=most impact

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Threatened, Endangered & Sensitive Species

Alts. A and B pose the least threat to potential goshawk or murrelet nests.

Harvest activities on this sale should not cause any impacts to currently listed threatened or endangered species (Arctic and American peregrine falcons, humpback whales and Steller's sea lions). Neither are there any expected effects on Forest Service sensitive species (trumpeter swans, Peale's peregrine falcon, osprey).

The most likely potential for effects would be loss of nesting habitat for goshawks and marbled murrelets. There are no known nests for either species but goshawks could potentially nest and murrelets are likely to nest in the study area. If a goshawk nest is found in the study area, the "Interim Habitat Management Recommendations for the Northern Goshawk: Tongass National Forest 1992" will be implemented. These recommendations include establishing a 20-30 acre buffer around the nest where vegetation manipulation is not allowed. A copy of the recommendations is available from the Stikine Area Supervisor's office and is contained in the planning file. If a marbled murrelet nest is found a 30 acre buffer surrounding the nest is recommended. Ranking the alternatives in order of increasing potential for impact to murrelets and goshawks, based on the amount of old growth acres harvested, would be A, B, G, D, P, F, E. Alternatives D and G have similar acres harvested but it is assumed that using group selection harvest in alternative G would better preserve the integrity of the old growth forest structure.

There are two species of plants listed as Category 2 Candidate species which may occur in the area. These are Calamagrostis crassiglumis (a reedgrass) and Carex lenticularis var. dolia (a sedge). Both are found in wet meadows and may be found in estuarine or beach grass flats. All proposed LTF sites would impact the beach grass habitat type. In July 1993 Mike Duffy, a botanist with the Alaska Natural Heritage Program searched these sites for these two species as well as other rare plants. Neither of the two Category 2 plants were found at any of the proposed LTF sites, therefore there should be no negative impacts from any of the alternatives on these two species.

Retention, Fragmentation and Patch Size

About 950 acres of additional harvestable old-growth was designated to be retained under all alternatives.

To help mitigate effects on wildlife, a system of retaining harvestable old-growth for wildlife habitat was developed under the Forest Plan. Table 4-9 shows the percentage and number of harvestable acres which need to be retained for each category. Acres of habitat for each category often overlap, but areas designated for retention for each category should not overlap if at all possible. For example, many of the acres of eagle nesting habitat also meet the requirements for deer and goat winter range as well as several other categories. But since 100% of these acres are retained for eagles, retention for these other categories needs to be allocated in other areas. Approximately 960 acres needs to be retained or managed for its old growth characteristics to meet current TLMP direction. All alternatives meet this direction. A majority of these acres were placed within the Saltwater Influence Zone since this zone has the highest overall habitat values.

Areas of forest excluded from harvest for legal or economic reasons are not used to determine retention acreage, i.e., TTRA buffers, high hazard soils and the inaccessible stands in the upper watersheds. Beach and estuary buffers are included because under the present TLMP they are available for harvest. The TLMP Revision does not include provisions for designating old-growth acres by project. Therefore the acres designated for old growth management are for this planning period only, but our recommendations will show future planners the options, management strategies and areas important to wildlife considered by our team. General strategies for placement of retention acres are presented in Chapter 2 and are shown in Alternative maps in Chapter 2.

**Table 4-9, Old Growth Management Acreages as Directed by
Tongass Land Management Plan**

Code	Original Acres	% To Retain	Acres to Retain
41 - bear-beach	621	5%	31
42 - bear-estuary	285	25%	71
43 - bear-riparian	393	20%	79
45 - deer-high elevation	1205	5%	60
46 - deer-low elevation	1899	5%	95
48 - goats	1628	5%	81
49 - furbearer-upland	2111	5%	106
50 - furbearer-beach/riparian	993	10%	99
51 - landbird	3104	5%	155
56 - eagle nests-low density	380	15%	57
58 - eagle nests-high density	122	100%	122
Total	3104	NA	956

**Table 4-10, Acres of High Value Habitat* Designated for Old
Growth Management by Alternative**

Species	Alt B	Alt D	Alt E	Alt F	Alt G	Alt P
Deer	685	576	615	666	666	642
Brown Bear	116	185	125	137	137	125
Goat	262	126	137	119	119	169
Marten	824	845	780	858	858	833

*High value habitat for deer is HSI >.42. High value habitat for brown bear, goat and marten is HSI >.66.

4 Environmental Effects

Alts A, B and G fragment existing old growth areas the least.

All alternatives place the majority of old growth management acres in the Saltwater Influence Zone. This is consistent with direction for current TLMP retention and the TLMP Revision standards and guidelines for beach fringe and estuarine management. Alternative B retains other acres on the West Face which is best for goat and deer winter range and causes the least fragmentation. Alternative G would be similar to B in effects on fragmentation assuming that the group selection units are small enough to be functionally similar to natural forest openings. Alternative D is intermediate in maintaining goat winter range and causing fragmentation by retaining goat habitat and old growth forest in Frank Creek. Alternative P causes slightly less fragmentation and loss of goat winter range than Alternatives E and F. Alternatives F and G concentrate old growth habitat acres in Tom Creek which should benefit bears, geese, eagles and waterfowl. Alternative E maximizes fragmentation, disperses retention acres and has the most impact to species conservation values.

Table 4-10 indicates the maximum and minimum changes that would occur in the size, acreage and perimeter of old growth blocks. Figure 4-2 illustrates what would happen under alternative E, which represents the maximum effect. Units 7 and 8 on the West Face would split the large block connecting the Marten Creek drainage and the study area. Alternative B is the only action alternative that would not split the block. The relatively small increase in perimeter is due to most of the units east of Frank Creek occurring on the edge of the forest blocks. Thus taking "bites" out of the edges rather than creating "holes" in the forest interior.

FIG. 4-2, MAXIMUM HARVEST EFFECTS ON OLD GROWTH BLOCKS

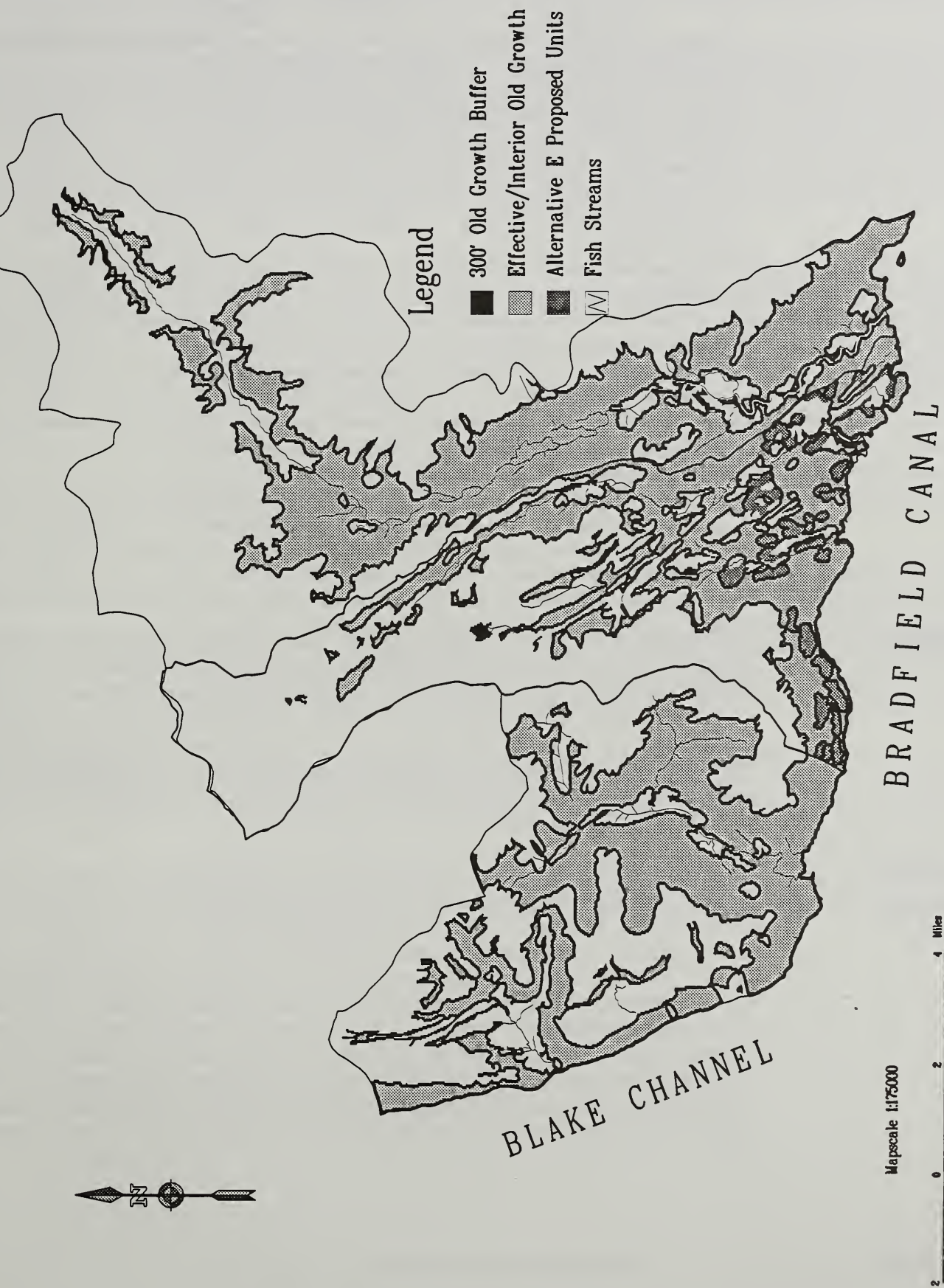


Table 4-11, Effects of Fragmentation on Interior Old Growth Forest

Measure	Original Condition Alt A	Minimum effect Alt B	Maximum effect Alt E
#blocks >1000 acres	2	2	3
acres in blocks >1000 acres	24,556	23,763	22,540
% of original condition	100	97	92
miles of perimeter in blocks >1000 acres	201	201	202
#blocks < 1000 acres	54	56	62
acres in blocks < 1000 acres	4,346	4,375	4,416
% of original condition	100	101	102
miles of perimeter of blocks < 1000 acres	108	110	116
total interior acres	28,902	28,138	26,814
% of original condition	100	97	93

Corridors

Because there will be no harvest in the saltwater influence zone, travel corridors along the beach fringe will be maintained in all alternatives. Vertical corridors are maintained by leaving uncut strips within areas of concentrated units, ie., low elevation on the West Face (units 3-7), east side of Frank Creek (units 15-19), and Tom Creek units 27 and 28. Alternatives B and G best maintain the integrity of the corridor on the West Face connecting the study area and the Marten Creek drainage. The road associated with harvesting in Tom Creek (Alternative E) would impact the corridor between the Harding River and Tom Creek drainages.

Vegetation Structural Diversity

In all alternatives the use of diameter limit harvests and helicopter logging systems should leave more structural diversity in the remaining stand than typical cable system clearcuts (See illustrations in Figure 4-5 through 4-9, later in this chapter). In many units, additional small clumps of trees will be left, centered on large snags or cull trees, to maintain snag and down wood components (See unit cards, Appendix A). It is recommended that all cull trees be left standing where the safety of operations permit. Leaving snags and "defective" green trees is intended to reduce impacts to species that use cavities, such as hairy woodpeckers, marten and others. The use of group selection cuts in alternative G should more closely mimic small scale natural disturbances, thus maintaining horizontal structural diversity. Alternative E harvests the most acres and has the most clearcuts so would reduce old growth habitats the most.

Cumulative Effects

By the end of the harvest rotation up to 16% of the forest in the study area may be in managed stands (based upon the total number of acres which are suitable and accessible). Units under Alternative E most closely resemble possible managed stands. The habitat value of the managed stands will vary through time as the forest regenerates and matures, but may never regain their highest value as old growth forest.

Alaska Department of Fish & Game (ADF&G) Wildlife Analysis Area (WAA) 1812 includes VCU's 509, 510, 511 and part of 505. VCU's 509 (Marten Creek) and 511 (Harding River) are currently in LUD II designations which precludes management for timber production as does the TLMP Revision preferred alternative. Part of VCU 505 may be included in the Blake timber sale scheduled for 1998. The amount of timber harvest that would occur in the portion of the VCU included within WAA 1812 is unknown at this time.

A large part of the Bradfield will likely remain in a natural condition.

The Bradfield Canal area also includes WAA's 1813 (Bradfield River), and 1814 (Hoya and Canal Creeks). A 25 MMbf timber sale is tentatively scheduled for Canal and Hoya Creeks in 1996. Approximately 170 MMbf of timber were harvested in the Bradfield River during the 1960's and 1970's. Also within these WAA's are the Anan Creek, Eagle River, Tyee Creek and White River drainages which are in Land use designations which do not manage timber. Thus, a significant portion of the Bradfield Canal will be managed in a natural condition. The proximity of undisturbed VCU's to sale areas should conserve sufficient habitat to maintain viable populations in the Bradfield Canal area even under current harvest plans. These natural areas are particularly important for species that need large areas to maintain viable populations such as bears, eagles, and goshawks.

The TLMP SDEIS (Appendix L) lists possible changes in habitat capability for MIS in these WAA's compared to 1954 levels. Brown bears, goats and Vancouver Canada geese are expected to maintain at least 90% of original habitat capability through the end of the 5th decade (approximately 2040) in all 3 WAA's. Other MIS are more heavily impacted by past activities in WAA 1813 but only hairy woodpecker habitat capability is expected to decrease below 90% for WAA's 1812 (87%) and 1814 (84%).

More human access may be the greater threat to wildlife in the Bradfield over time.

The State of Alaska maintains road corridor rights of way within the study area for a road connecting Wrangell to the mainland road system in Canada. Full analysis of the potential impacts of that project are beyond the scope of this document. However, the improved access and increased number of visitors would likely have significant impacts on wildlife resources. Increased human access resulting in increased disturbance and harvest of wildlife species poses a much greater threat to wildlife populations over time in the Bradfield than the currently planned habitat manipulations due to timber harvest.

Issue Five: Goats

This issue addresses the effects of harvest on goat winter range, disturbance of kidding and rearing areas, travel corridors.

Alternatives A, B and G have the fewest effects on goat habitat.

The most valuable goat habitat occurs in the saltwater-facing uplands, where the majority of harvest also occurs under most alternatives. The most potential for impacts occurs on the West Face. Table 4-11 shows the number of acres of high, medium and low value goat habitat harvested for the VCU and the WAA. The study area contains 29% of the high value goat winter range in the WAA and 46% of the high value habitat that occurs next to salt water (Figure 4-3). Under Alternatives E and F 13% and 4% of the high value goat habitat would be harvested in the VCU and WAA respectively. Of the action alternatives B would have the least impact by only harvesting 1% and 0.3% of high value habitat. The alternatives listed in order of increasing impact are A, B, G, P, D, and F & E (Table 4-8). Harvest of high HSI value habitat in the east part of the Frank Creek drainage is not considered as great an impact as harvest on the West Face because it is separated from summer range by Frank and Tom Creeks. The units with the most impact goats would be #1, #2 and the east part of #4. These units are relatively level sites above cliffs where goats rest and feed because they have a good view of the surrounding area and have close access to cliffs for escape from predators (C. Smith, ADF&G).

FIG. 4-3, GOAT WINTER RANGE IN THE WAA

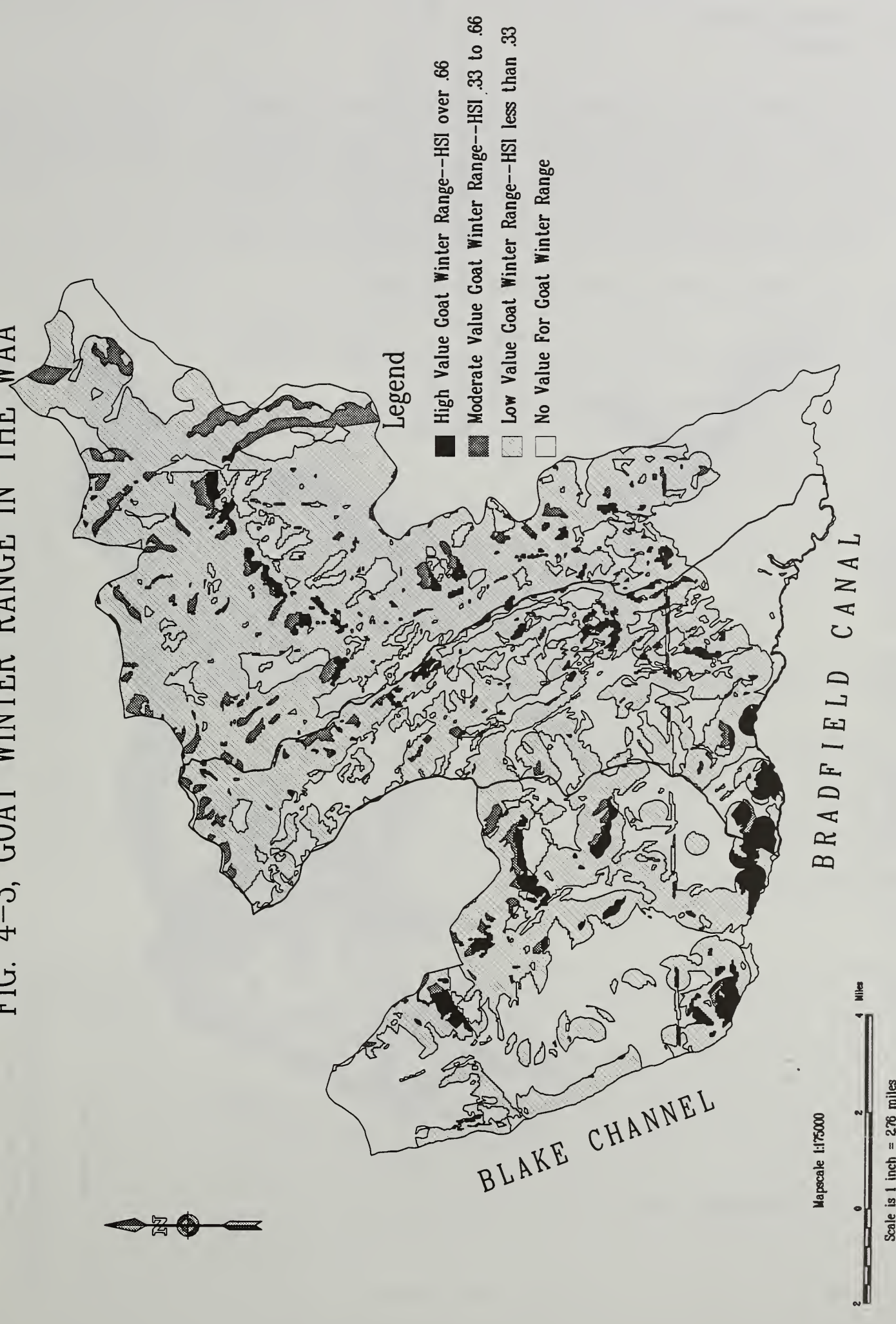
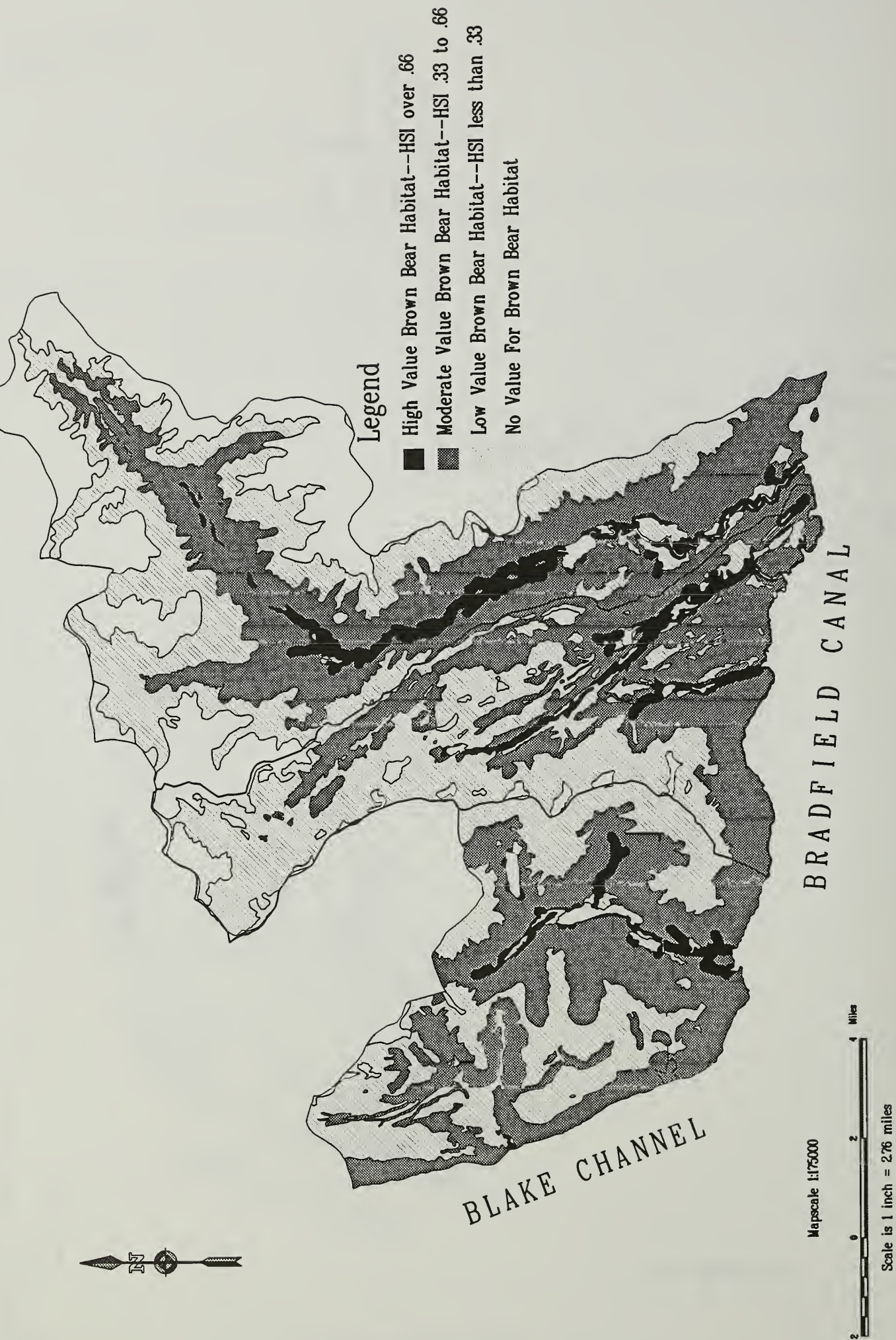


FIG. 4-4, BROWN BEAR HABITAT IN THE WAA



Timing restrictions and helicopter guidelines are used to minimize effects.

Mitigations for harvesting near goat habitat follow proposed TLMP Revision standards and guidelines for timing restrictions. They include maintaining a 1000 foot vertical or horizontal clearance of helicopters from visible mountain goats at all times; no use of helicopters at the West Face LTF from January 1 to March 31; and avoid helicopter yarding of units 1,2,4,8 and 13 during winter and kidding seasons, January 1 - June 30. Additional measures could be taken by the Forest Supervisor to drop units #1 and #2 and possibly the east part of unit #4 to protect goat habitat.

Table 4-12, Harvest Acres in Goat Habitat

Habitat Value	Alternative Acres Harvested							Total Acres In:	
	A	B	D	E	F	G	P	VCU	WAA
High	0	12	127	139	139	53	95	1,092	3,822
Medium	0	0	3	3	3	1	3	566	3,718
Low	0	221	163	415	348	284	282	8,852	54,221
Zero	0	49	136	324	74	59	99	17,190	34,831

Issue Six: Brown Bears

This issue addresses the impacts of harvest and roads on brown bear habitat and potential increases in hunter harvest both during and after logging.

On Chichagof Island bears avoided clearcuts (Schoen and Beier 1990). Recent clearcuts produce abundant berries but protective cover is lacking and slash makes travel difficult. Older second growth forests have little value due to the lack of forage. Table 4-12 shows the amount of bear habitat harvested in the VCU and WAA. The study area contains 27% of the high value bear habitat for the WAA (Figure 4-4). Under Alternative E, 7% of the high value habitat in the VCU and 2% of the high value habitat in the WAA would be harvested. Alternative D would harvest the least at 2% (VCU) and 0.5% (WAA). Table 4-8 shows the reduction in habitat capability and rank of each alternative for impacts to brown bears.

The greatest impacts to bears come from better access created by roads.

The greatest impacts to bears are associated with human access which results in increased disturbance, hunting mortality (legal and illegal), and defense of life and property kills. Schoen and Beier (1990) reported a correlation between cumulative length of road built and fall brown bear kill. Table 4-14 shows the density of accessible travel routes (roads, saltwater and navigable streams) in the study area. The lower Tom and Frank Creek values were obtained by calculating the area of the watersheds upstream to the farthest access (eg, Tom Lake, refer also to Figure 3-4). Adjacent watersheds analysis areas used the entire area of each watershed that would likely be accessed by each access type. Alternative E would have the greatest impact because of roading in both drainages. Alternatives B, F, and G would be intermediate and Alternatives A, D and P would not have roads. The road in Tom Creek would likely have a greater impact than the road in Frank Creek because of its proximity to the corridor between the Tom Creek and Harding River drainages (see discussion for Issue 1).

4 Environmental Effects

The Tom Creek Road would have a greater impact than the Frank Creek Road.

The influx of people associated with timber harvest would likely increase the hunting pressure in the area. In a typical operation of this size approximately 30 - 35 people at one time could be involved for 1-2 years. Species such as brown bear which cannot sustain high hunting pressure may be heavily impacted by such an influx. Potential measures to mitigate these impacts could include closing the bear season in this area during timber harvest operations (requires coordination with ADF&G). Alternatively, the Forest Service could require that company transportation not be available for use by employees (Forest Service and contractors included) for hunting access to the area, similar to what was done at the Greens Creek Mine on Admiralty Island. However, the Forest Service cannot restrict employees use of personal equipment for hunting after work hours. Therefore this second potential mitigation measure may not meet the objective of reducing hunting pressure during the contract period. The non-roaded alternatives (D and P) would be much less likely to result in increased harvest of brown bears.

Table 4-13, Harvest Acres in Brown Bear Habitat

Habitat Value	Alternative Acres Harvested							Total Acres In:	
	A	B	D	E	F	G	P	VCU	WAA
High	0	44	24	92	45	43	31	1,389	5,062
Medium	0	236	454	786	517	351	445	9,871	39,909
Low	0	2	0	3	2	2	2	14,481	39,486
Zero	0	0	0	0	0	0	0	1,959	15,084

Table 4-14, Human Travel Corridor Density

Area	mi ² Accessed	Road Length (mi)	Stream/ Shore Length	Density w/o road (mi/mi ²)	Density w/road (mi/mi ²)
Lower Tom Cr	5.9	3.3	4.1/4.9	1.5	2.1
Tom & adjacent watersheds	31.5	3.3	4.1/4.9	0.3	0.4
Lower Frank Cr	1.6	1.3	0/0.7	0.4	1.3
Frank & adjacent watersheds	5.5	1.3	0/0.7	0.1	0.4
Entire VCU	43.3	4.6	4.1/12.2	0.4	0.5

Issue Seven: Soil Productivity

This issue addresses the effect of harvest proposals on soil productivity, resulting vegetative composition, and structure over time.

Soil Productivity

Management practices designed to protect the long-term productivity of the soil have been applied to all alternatives. All alternatives are expected to meet or exceed Soil Quality Standards (FSH 2509.18 Soil Management Handbook R10 Supplement 9/90), and therefore, have no measurable adverse effect on the long-term productivity of the soil.

BMP's, helicopter yarding and small leave trees decrease risk of soil disturbance.

There would be little risk of detrimental soil disturbance in units that are yarded by helicopter. Full suspension of logs (both ends of the log suspended above the ground) by helicopter is designated where needed to prevent mass movement or surface erosion. In addition, units that contain steep, high hazard soils have harvest prescriptions that leave all trees less than 12 or 16 inches in diameter to retain much of the rooting strength contributing to the stability of the soil.

Alternative G would likely result in little or no immediate soil disturbance because all yarding will be done by helicopter, however it has the most risk of post-harvest damage to soils resulting from blowdown in units designated for group selection harvest.

Only Alternative E contains harvest units to be yarded by cable systems. On these units, partial suspension of logs (lead end of log suspended above the ground) is recommended on all cable yarding settings. This is primarily to prevent displacement of the nutrient rich surface soil layers. Units designated for cable yarding in Alternative E do not contain areas of high hazard soils.

Roaded alternatives would take more lands out of production.

Alternatives B, E, F, and G build road in Frank's creek watershed, Alternative E builds road in both Frank's and Tom's creek. This would have the effect of taking some land out of production. These roads are designed to maintain the natural drainage pattern to prevent detrimental changes in soil drainage. Length and width of temporary spur roads are to be kept to a minimum to reduce the amount of forest land taken out of production. All disturbed area of bare mineral soil will be revegetated by application of the prescribed grass seed and fertilizer during the next growing season.

Soil Erosion

The relative risk of excessive soil erosion from timber harvest can be rated in terms of the amount of timber harvest and road construction on hazardous soil types. Soil hazard classes rank the probability of soil erosion, in the form of mass movement, resulting from logging or road building activities. The probability is related to a number of factors such as soil strength, soil wetness, and slope. In general soils in the low hazard class are found on relatively gentle slopes. They are stable in the natural setting and have little probability of soil movement if disturbed. Moderate hazard soils are generally found on about 35 to 75 percent slopes. They are usually stable in the natural setting but the probability of movement increases if they are disturbed. The soils in the high hazard class are typically found on slopes of 65 to 75 percent and greater. They often show signs of soil instability in a natural setting and are extremely prone to soil movement if disturbed by road building or harvest practices.

4 Environmental Effects

We will implement special practices when harvesting on high hazard areas.

Table 4-15 shows the area of land in each hazard class that would be harvested in each alternative. This data is derived by comparing the proposed harvest units to the Soil Resource Inventory in the GIS. Areas proposed for harvest on high hazard soils in Table 4-2, have special practices prescribed to minimize increasing the instability of the soil. These practices include full suspension yarding by helicopter and limiting harvest to tree diameters exceeding 12 or 16 inches breast height to maintain root strength.

Table 4-15. Acres Harvested in Each Soil Hazard Class

Soil Hazard Class	No Action	Alt B	Alt D	Alt E	Alt F	Alt G	Alt P
Low	0	11	22	93	23	34	23
Moderate	0	230	360	700	467	316	372
High	0	43	52	89	75	46	81
Total	0	284	434	884	565	396	476

Road building impacts are related to the length of road constructed and the soil hazard class in which each segment is built. Table 4-16 shows the miles of road within areas of a predominant hazard class. Often, benches within high or medium hazard areas are used for road location which can reduce the overall impact of road construction. Alternative E would pose the greatest risk to soil erosion.

Table 4-16. Miles of Specified Road Proposed in each Soil Hazard Class.

Soil Hazard Class	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt P
Low	0	1.0	0	3.2	1.0	1.0	0
Moderate	0	.3	0	1.1	.3	.3	0
High	0	0	0	.3	0	0	0
Total	0	1.3	0	4.6	1.3	1.3	0

Vegetative Structure

The harvest of timber would have the immediate effect of reducing the amount of vertical structure in the stand. Vertical structure can be defined as the different heights and layers of trees, shrubs and forbs. Typically in an old growth stand the trees vary in height from under an inch to over 180 feet tall. Data from this study area shows spruce trees over 200 feet tall and hemlock trees over 170 feet. Generally the more trees removed in an area the greater the loss of structure. Within 5 years after harvest numerous small trees will be growing.

Harvest methods should leave multi-storied, largely even-aged stands over time.

This sale has alternatives which rely on harvest of trees over a certain diameter limit. Trees smaller than 12-16 inches would not be harvested under this method (see Unit Cards, Appendix A). In addition, most units leave some scattered, larger trees for increased diversity. Figures 4-5 thru 4-9 illustrate the structure and composition which should be left with the overstory removal harvest method. These sketches show relative changes in vertical structure under different diameter limit cuts. The heights shown are from trees measured in the study area. Greater diversity should result in the stand over time as some of the leave trees and newly established trees grow. The only uncertainty with this method is predicting the number of trees left after harvest and the percentage of these trees that will continue to grow of "release" due to increased light.

Figure 4-5, 9" Diameter with Cable Yarding



Figure 4-5 shows the most common example of harvest in southeast Alaska. Few trees are left standing except between settings of the cable. Most trees left are below a 1 foot.

Figure 4-6, 12" Overstory Removal with Helicopter



Figure 4-6 shows that more trees should be left than in a clearcut by cutting trees larger than 12" and yarding with a helicopter. Some will be damaged when felling larger trees since the majority of trees are still removed leaving an estimated $<1/4$ of the original trees.

Figure 4-7, 16" Overstory Removal with Helicopter

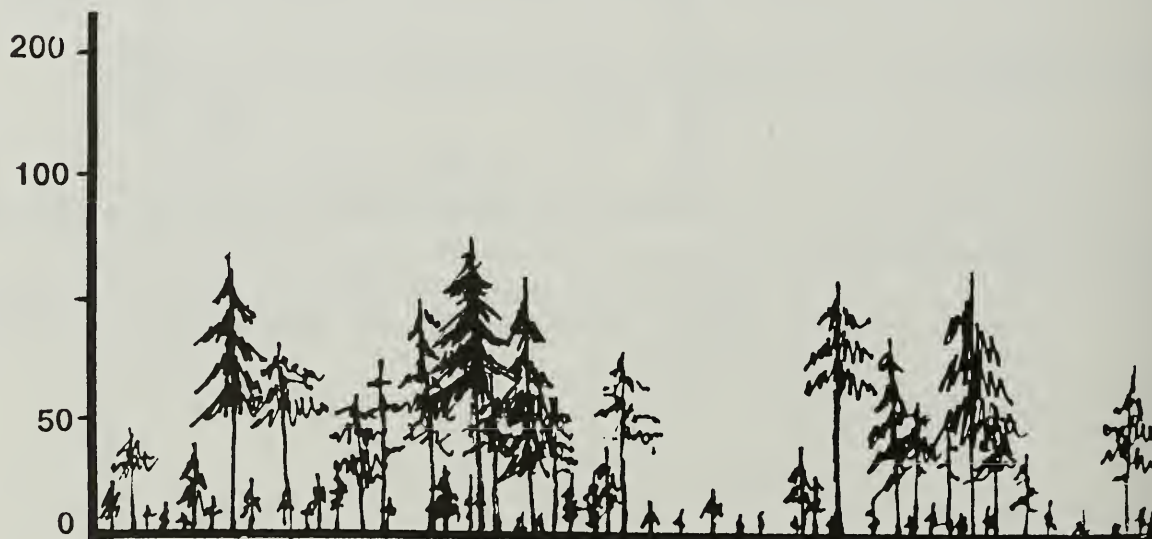


Figure 4-7, illustrates that an estimated $1/4$ to $1/3$ of the original trees should remain after harvest by only cutting trees larger than 16" in diameter. Trees remaining would also be taller.

Figure 4-8, 16" Overstory Removal with Leave Trees and Helicopter

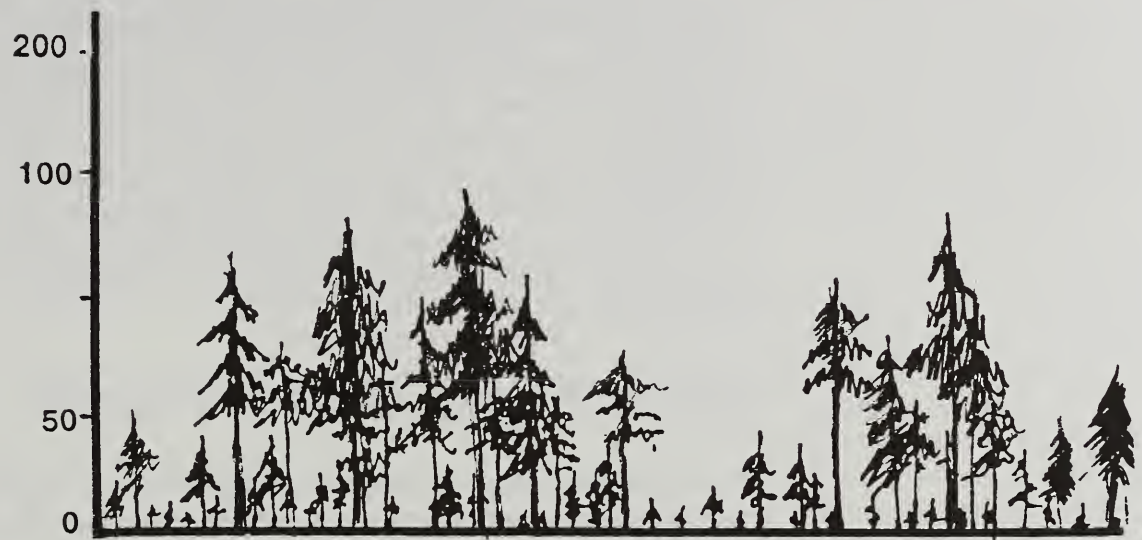


Figure 4-8, shows that in addition to the trees left in 4-7 several large trees could be left to add more diversity to the stand over time.

Figure 4-9, Old-Growth Structure



For comparison, Figure 4-9 illustrates the original multi-storied and multi-aged old growth forest.

The prescriptions have a dual objective of managing some of the existing stand (large snags, potential snags and small trees) and regenerating the stand. The "overstory removal w/leave tree" harvest prescription will accomplish this because of the heterogeneous nature of the existing stands. There are areas within the stand that will have many trees taken out and others where almost no trees will be taken out. The regenerated stand is the primary stand being managed for future timber production. However, some release is also expected in the trees retained which will also produce future timber. The best available information projects that this harvest will lead to a patchy "regeneration-release-snag recruitment" matrix which will be managed as a multi-storied, largely even-aged stand over time. The results should mimic a stand structure which would occur with large scale blowdown (except less soil disturbance will result) due to helicopter yarding. (See Unit Prescriptions & Unit Cards, Appendix A)

Issue Eight: Social Values

This issue addresses the effects of the alternatives on social values, the cultural resources, subsistence and the setting for established human uses in and around the study area.

Human Habitats

The human habitat concept was used in Chapter 3 to illustrate a synthesis of all the social components of the study area landscape. We use this concept again to summarize the effects of each alternative on the overall social environment. Alternative E poses the greatest overall change to the existing human habitats and use patterns while alternatives B and G pose the least amount of overall change. Alternatives D, P and F pose intermediate levels of change and make tradeoffs in different areas. Alternatives D and P avoid changes to the stream valleys and retain existing access patterns, while Alternative F changes the West face and Frank Creek areas but retains the existing condition in Tom Creek.

Summary of Effects on Human Habitats

Alternative	Area, Change	Effects Description
Alt. A	All, unchanged	All past and present areas would remain unchanged as described in Chapter 3. Benefits potential tourism growth. Scenic values remain natural. Economic advantage may be to delay entry until economics improve.
Alt. B	Frank Creek; visually modified, interior access	Impacts the fewest number of existing habitats; hike-in access into the Frank Creek watershed would be improved; visitors seeking easier access into interior and are tolerant of a modified appearing area will be favored by 1 1/2 miles of increased access; views from the Bradfield Canal would be partially retained and impact the smallest % of the viewshed; short term decrease in use of area for 1-2 years during logging but this decrease would be the least in duration and extent of action alts.; increase in ability of land to produce wood products lowest but retains the most future harvest flexibility.
Alt. D	All; visual change, no change in access	No increase in interior access to watersheds thereby retaining existing human access pattern; next to greatest affects on seen area from the Bradfield; visual quality is partially retained to very modified depending on success of harvest method; interior settings of Frank Creek is least affected of all alts.; Tom Creek interior setting somewhat affected in subparts F & G; potential goat hunting opportunities may be impacted by decrease in habitat acres; west face LTF visible for 2-3 years; short-term decrease in use of area for 1-2 years during logging; ranks third in the ability of VCU to produce wood products but may foreclose on future economically viable offering in Frank and Tom Creeks.

Summary of Effects on Human Habitats (continued)

Alternative	Area, Change	Effects Description
Alt. E	All & Harding R.; visual & access	Introduces the most change to the study area as primitive landscapes are converted to roaded natural (Tom) or roaded modified (Frank); hike-in access is increased in both Tom and Frank Creek and the Harding River; hunting and fishing will increase in Tom Frank and Harding as a result of increased access and use; user looking for easier access in semi-natural or modified landscapes will have increased opportunities; views from Bradfield will be most affected; visual quality is partially retained or very modified depending on success of partial harvest method; decrease in use of area for 1-2 years during logging and is the most extensive area affected and duration; has the highest timber production rate with no or few future entries for rotation.
Alt. F	West Face, Frank Creek; visual & access	Combines the effects of Alt. B and D, except no change to any of the Tom Creek watershed; retains existing look and access pattern in Tom Creek watershed; views along Bradfield are affected near west face and Frank Creek; second highest timber production rate but may foreclose on possibility of an economically viable entry into Tom Creek in the future.
Alt. G	West Face, Frank Creek; visual & access	Same areas are affected as Alt. F but impacts to human habitats more closely resemble Alt. B; only subareas C, D and E will have noticeable change since group selection harvest methods are used on west face; impacts to habitats same as Alt. B with the addition of the west face LTF which will appear modified for 2-3 years; although third highest acres are harvested, has fourth highest timber production rank since group selection technique results in slower growth rate than other methods.

Summary of Effects on Human Habitats (continued)

Alternative	Area, Change	Effects Description
P	West Face and Frank Creek visuals; no change in access.	No increase in access to watersheds; fourth ranking in terms of effects to watershed; visual quality is retained to modified depending on success of harvest method; interior settings of Tom Creek are unmodified; west face LTF visible 2-3 years; short-term decrease in use of area for 1-2 years during logging; ranks third in ability to produce wood products.

4 Environmental Effects

Cultural Resources

Cultural resources within the study area may contain significant information on past environmental conditions and human lifeways, possibly including information related to past conditions along the north Pacific Rim. Cultural resources are both fragile and non-renewable. Primary impacts can include alteration to the settings of sites; alterations of above ground or intertidal objects, features and structures; as well as the spatial relationships among them; and disturbance or destruction of subsurface cultural deposits. Secondary impacts may include a higher frequency of site looting and vandalism due to increased access from project development.

Federal laws and regulations (including the National Historic Preservation Act of 1966, as amended; the Archaeological Resources Protection Act of 1979, as amended; and the American Indian Religious Freedom Act of 1978) require a process for considering the impacts of Federal projects on cultural resources. In brief, this process, outlined in Section 106 of the National Historic Preservation Act, involves identifying cultural resources, determining which are significant or eligible to the National Register of Historic Places, evaluating project effects to significant sites, and designing and implementing measures to negate any adverse effects. This process is undertaken in consultation with the Alaska State Historic Preservation Officer and the Advisory Council on Historic Preservation where adverse effects are found.

We used a model to predict cultural resource potential.

The Stikine Area developed and implemented a cultural resource model to predict site potential for any given portion of the study area. It is apparent that the seashore and coastal environment was the focus of most activities of the people who have inhabited the region and that sea levels have fluctuated throughout time. Therefore it appears that past sea levels play an indicator role in locating cultural resources and the key criteria for establishing probability zones for cultural resources is elevation above the present coastline. Examination of past survey records on the Tongass National Forest indicates the potential for discovering cultural resources above 100 feet in elevation is low throughout southeast Alaska. Our implementation of 500 foot beach fringe and 1,000 foot estuary buffer zones with this project effectively minimizes the possibility of impacting cultural resources eligible to the National Register of Historic Places under all alternatives.

None of the alternatives will affect discovered cultural resources.

None of the considered alternatives will pose an effect to discovered cultural resources. All of the known study area sites will be avoided and a minimum 300 foot protective buffer is established around each site. All point specific impacts occurring in the high probability zone have been field surveyed. Reports summarizing the 1992 and 1993 field surveys have been submitted to the Alaska State Historic Preservation Officer. The State Historic Preservation Officer concurred with our determination that nine of the 11 sites are eligible to the National Register of Historic Places. They also agree that the proposed timber sale will have no effect on any historic properties (sites eligible to the National Register of Historic Places) in the area of potential effect. With that agreement the Stikine Area has met it's consultation requirements under Section 106 of the National Historic Preservation Act.

Impacts from decay, natural landscape changes and development may pose a cumulative threat to the preservation of significant study area cultural resources. Future timber harvest combined with other ground disturbing activities could result in the loss of cultural resources. Increased access to cultural resource sites will be periodically monitored to determine if any natural or human-caused impacts are occurring. Previous cultural resource surveys indicate most if not all of the cultural resources are located within a short distance of the present coastline. It is impossible, however, to determine the exact number and nature of cultural resources that are threatened by future development. Maintenance of a 500 foot beach fringe and 1,000 foot estuary protective buffer zone for future development will effectively lessen the potential impact to cultural resources. Implementation of field surveys and various mitigation measures will reduce the potential loss by preserving significant sites and by providing data on those that can not be preserved.

Scenery and Recreation

The Campbell Timber Sale presents an opportunity to investigate a different type of visual landscape management. Clearcut harvest methods require that individual harvest units be carefully designed and generally become smaller as scenic concerns become stronger. After a certain period of time, the landscape becomes increasingly "patchy" in its appearance. This eventually leads to a change in the landscape character from a relatively homogeneous appearing landscape to a heterogeneous mix of "patches."

There is an opportunity to harvest more acres and not affect scenery as much, if harvest methods work.

Due to the use of helicopter and low to moderate potential for blowdown in the study area, this sale presented an opportunity to harvest whole viewsheds under a single entry and have less overall visual effect. By treating larger areas with partial cutting, the viewer only notices changes in the texture of the landscape instead of forms or "units." The larger the scale of these texture changes the better so they are as large as the southeast Alaska landscape seems to the viewer. The character of the existing landscape is also retained under this harvest method since large areas remain more homogeneous in texture and form.

This is somewhat experimental and not all landscapes have the same characteristics present in the sale area. Unit designs did account for some of this risk so that if the leave trees blew down and the result looked like a clearcut, the scenery would appear modified but still bear some resemblance to natural forms. For this reason, all alternatives have the potential to meet or exceed the inventoried Visual Quality Objectives for the area. However, different alternatives pose more risk to the visual resource. This risk is increased by the number of acres of overstory removal used in the seen area. Alternatives E, F, P and D pose the greatest risk; Alternatives A, B and G the least. "Success" will be defined by the number of trees left over time in the units and the achievement of the Partial Retention VQO.

Roads would not be visible from the Bradfield Canal in any alternative, though the log transfer facilities or sort-yards included in each alternative vary in their degree of impact to the visible landscape. The light-colored granitic local rock does not favor easy concealment of rock pits and shotrock pads.

4 Environmental Effects

Alternative E alters existing recreation settings the most since it harvests in all areas and builds roads up both Frank and Tom Creek. Alternatives A, B, P and D would result in the least amount of change in the existing recreation settings but favor different users. Outfitting and Guiding activities would be benefited the most by alternatives that avoid development in Tom Creek (See "human habitat" descriptions above). The Tom Creek road would increase the use of the area by recreationists overall. Persons seeking primitive experiences would be displaced by more persons who can tolerate more people and some development.

Alternative A has no effects on scenic resources and retains the existing untouched visual condition. This would benefit those persons seeking a more semi-primitive or primitive recreation experience.

Alt A and B have the least effects and risk to scenic resources.

Alternative B would have the least visual change of any "action" alternative. Retention is met throughout most of the study area from the Bradfield Canal except for the LTF and the ridge at the mouth of Franks Creek which will meet the VQO of Partial Retention. As seen by potential Anan Bay visitors, there will be no effect at all. Inventoried Visual Quality Objectives (VQO's) should be exceeded since most of the the changes in the landscape will appear natural, especially 1-2 years after harvest.

Units 9, 11, 13, 18, 19, 20 and 21 will be seen from the Bradfield Canal. If the planned partial harvest method of overstory removal and patch cutting is successful, these units would meet the Visual Quality Objective of Partial Retention and the inventoried visual condition will change only slightly. These areas would be noticed by visitors but would not attract attention because they would be perceived as natural textures and openings (EVC Type II-III). However, there is some risk that overstory removal harvest may not retain the number of trees desired. If this occurs, some units would likely meet the VQO of Modification and the resulting units will attract attention (EVC Type IV). However, this action alternative has the least amount of risk associated with experimentation of this harvest method.

It appears likely that Franks Creek, a short drainage leading to no particular recreation objectives, would attract less recreation visitors compared to the wider and more interesting adjacent stream valleys of Tom Creek. This alternative avoids change in this watershed by concentrating harvest in Frank Creek (See, Human Habitat/section above). This alternative retains the existing condition of a key area of interest to most recreationists and outfitter/ guides.

Frank LTF will be natural appearing from the middleground.

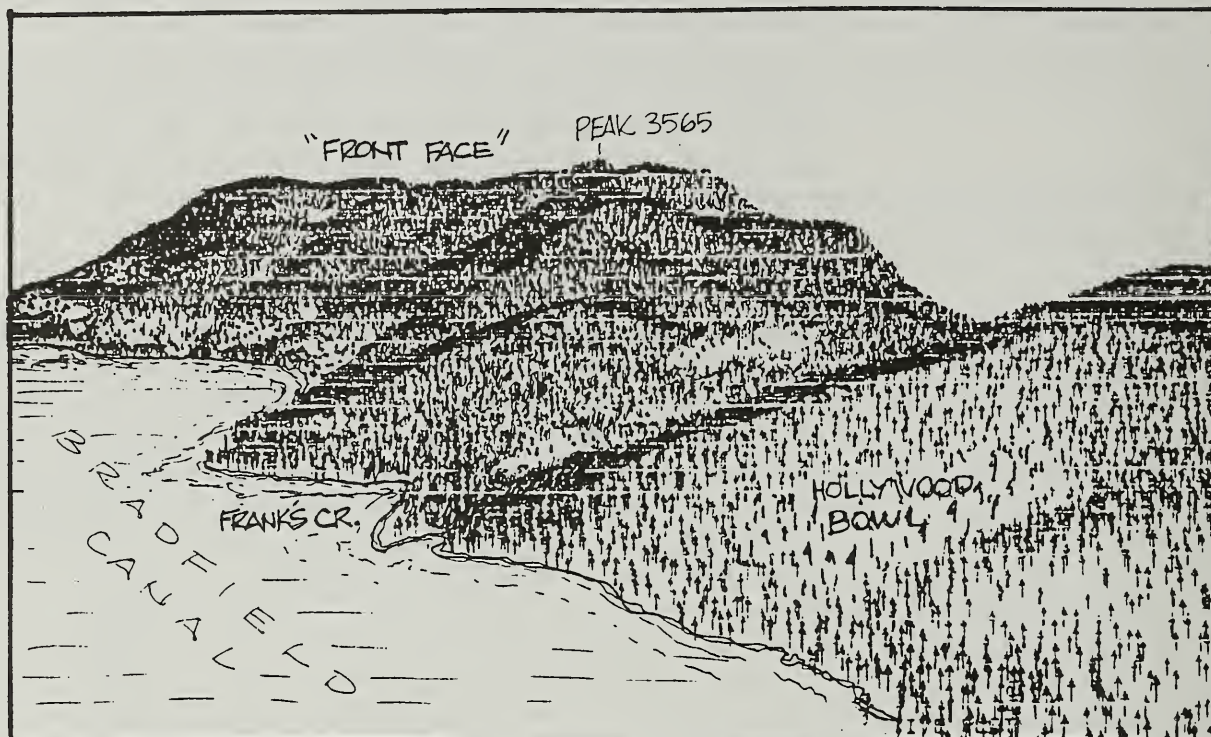
Franks Creek LTF- This log transport facility would meet the VQO of Partial Retention in the middleground. The LTF ramp itself is screened from the west and southwest but would be seen from the south and southeast. The headwall in the rockpit is favorably canted to the west and slightly north which makes it inconspicuous. The road approach stays inside a thin fringe of trees on the shoreline. Since trees will be cut along the beach, tree boles will be seen which will appear somewhat unnatural (under natural conditions, boles of beach fringe trees are not normally seen). The ramp, 250 feet long at low tide, runs along a shingle and rock beach at the very head of the little cove behind the the small island. Even when seen from the southeast the textural contrast will be minimal. The ramp will be 'edge-on' to the viewer. The granitic rock's unweathered color has not been determined in the field but it is not likely it will contrast markedly with the boulders and shingle on the beach. Underlying material has good bearing strength, eliminating the need for a thick (and conspicuous) overlay of shotrock to maintain a firm surface.

Alt D poses the most change in scenery in the Canal but changes the interior landscapes the least.

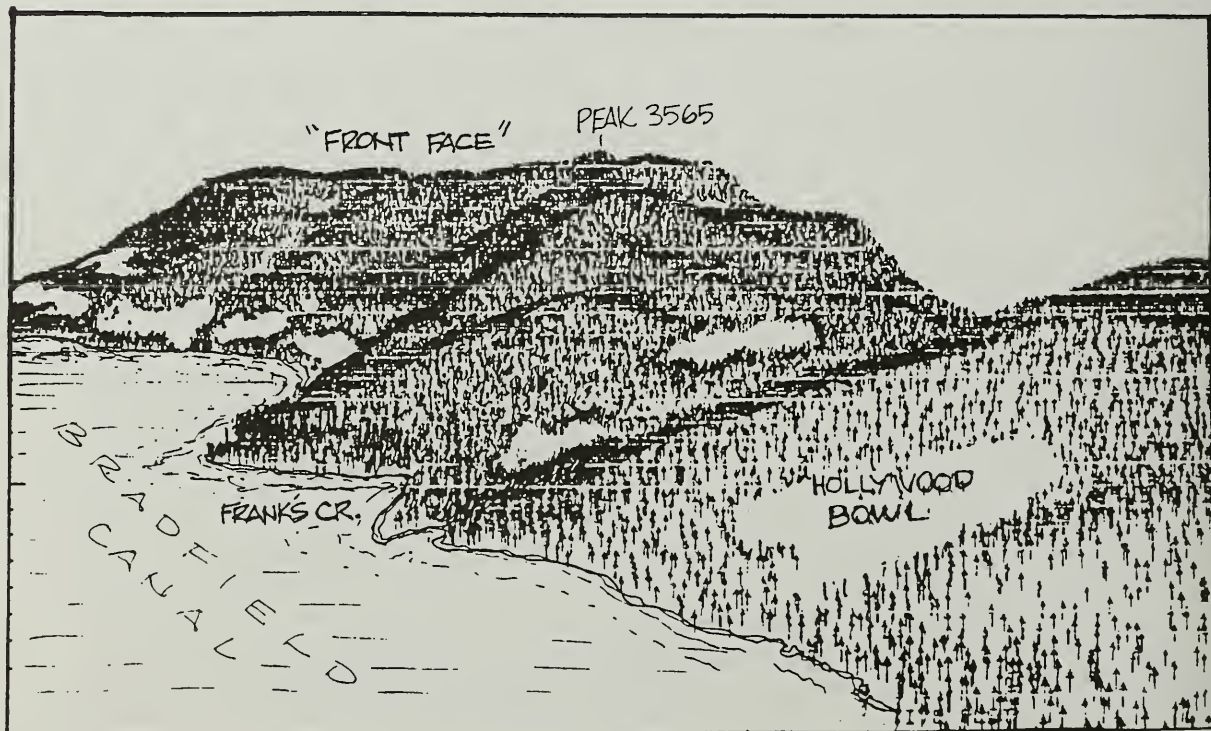
Alternative D would result in more change to the views in Bradfield Canal than any alternative. Again, although predicted visual results will exceed inventoried VQO's there is some risk that experimental harvest techniques will not be successful in meeting desired results. Alternatives D and E pose the greatest risk to visual quality should the overstory removal method not leave the predicted number of trees in harvest units. This is true because most of the harvest units under Alternative D are located in the area seen from the Bradfield Canal. Using helicopters only, almost all the suitable and accessible areas will be cut to a diameter limit. A 16" diameter limit will result in removal of approximately 2/3 to 1/2 of the trees (some are expected to be damaged during felling and yarding operations).

All units except for Unit 10 will be seen from the Bradfield Canal. If the planned partial harvest method of overstory removal is successful, these units will meet the Visual Quality Objective of Partial Retention and the existing visual condition will change only slightly. These areas will be noticed by visitors but will not attract attention because they will be perceived as being natural (EVC Type II-III). However, there is some risk that overstory removal harvest will not retain the number of trees desired. If this occurs, these units will likely meet the VQO of Modification to Maximum Modification (on the west face) and the resulting units could be obvious to visitors (EVC Type IV or V). Figures 4-10 and 4-11 illustrate the view of harvest units along the west face under the "best and worst case" scenarios.

**Figure 4-10, View of West Face if Partial Retention is Achieved
(Alternatives D, F, E and P)**



**Figure 4-11, View of West Face if Modification or Maximum Mod.
Results (Alternatives D, F, E and P)**



Visitors traveling to and from Anan Bay will see little evidence of timber management since only portions of Units 1-4 will be seen from this travel route.

West face sortyard and LTF will appear obvious to travelers.

The West Face sortyard and LTF. This area would be approximately 2 1/2 acres in size. Without screening, the sort yard would meet the VQO of Modification from the middleground. The shadowy exposed boles of the trees at the upper edge of the yard would contrast strongly with the probable light color of the local rock. This contrast and effects of the sortyard are expected to last 5 years after harvest. Rehabilitation of this area with planting or seeding would soften the effects after logging.

Alternative E combines the effects and risks of Alternatives B & D and adds another LTF in the bay to the east of the Harding River. In addition, the scenic quality of the Tom Creek watershed will be affected.

The Tom LTF will appear conspicuous for a short distance along the canal.

Tom's LTF would not be seen for the first ten miles of travel up the Bradfield Canal. The ramp, however, is much more conspicuous than Franks LTF to the few who would see it on their way along the Canal to the Bradfield River/Tyee area. The steep beach will require a 200-foot diagonal ramp aimed directly south out of the little cove in which it lies. The aspect of the headwall of the nearby rockpit will be similar, but a little west of south. It does not seem possible to leave a fringe of trees for screening between the headwall of the pit and the shoreline. The rockpit headwall and ramp would be seen well enough to meet only Modification. Bradfield Inlet is only a mile wide at this point; the average viewer will see Tom's LTF from the near middleground, about a half mile away.

The Tom Creek road may result in greater recreation opportunities for some users.

The Tom Creek road would be seen by recreationists who use it to gain access to the valley of Tom Creek and the Harding River. The fairly flat terrain is interspersed with low hummocks and interrupted frequently by muskeg openings. The experience of walking on the road will be one of seeing frequent small openings, some of them natural, in the foreground. The openings would meet Modification if seen in the near middle ground. One opening will be particularly conspicuous, a cable area in the NE corner of section 20 of which about six to eight acres will be seen from the road. None of the harvest units in Tom Creek will be seen from the Harding River corridor. For some types of recreation users the Tom Creek road would be a popular access into the Tom Creek and Harding River watersheds.

Alt F has the same effects on the Canal as Alternative E but does not change the Tom Creek area.

Alternative F would have slightly less effects and risks to the visual resource as seen from the Bradfield Canal as Alternative E. However, there would be no change in the visual resource of the Tom Creek viewshed. VQO's are exceeded in most areas if harvest methods leave the predicted number of trees. If harvest methods are successful, the VQO of Partial Retention will be met. If the methods are not successful the units will be obvious and meet the VQO of Modification to Maximum Modification.

The units to be cut in Frank Creek will be seen at an angle from the Bradfield Canal. Much of the timber operations are on the West Face. Using helicopters only, the suitable and accessible areas would be cut to a diameter limit of 16" resulting in removal of 1/2 to 1/3 of the trees. The West and Frank Creek LTF's would be used.

4 Environmental Effects

Alt G would have the same visual effects as Alt B.

Alternative G would have visual resource impacts similar to Alternative B with the addition of the West Face LTF. The group selection harvest method along the west face would meet the VQO of Retention and would not be noticed by visitors. Harvest within Frank Creek would have the same impacts as described above under Alternative B.

Cumulative Visual Effects- Over time there is the potential for increased development and impacts to the scenic resource. Harvest activities on the other side of the canal from the study area are expected after 1996. The combined effect of this potential sale and the Canal/Hoja sale could result in a highly modified visual environment. In addition, future road proposals could add further impacts to scenery. However, if the harvest methods of overstory removal are proven effective in this landscape they could be used for future timber harvest proposals and lessen cumulative effects.

Alt P has slightly less effects than Alternative F.

Alternative P would have slightly less effects over all than Alternative F. Three units (#1, #2, and west half of #3 would be dropped therefore minimizing the number of visible units from the Canal. There would be no change in the visual resource of the Tom Creek viewshed. VQO's are exceeded in most areas if harvest methods leave the predicted number of trees. If harvest methods are successful, the VQO of Partial Retention will be met. If the methods are not successful the units will be obvious and meet the VQO of Modification to Maximum Modification.

The units to be cut in Frank Creek will be seen at an angle from the Bradfield Canal. Much of the timber operations are on the West Face. Using helicopters only, the suitable and accessible areas would be cut to a diameter limit of 16" resulting in removal of 1/2 to 1/3 of the trees. The West Face LTF would be the only one used.

Outfitters and Guides

As a result of comments to the Draft an economic analysis was conducted on the possible impacts of timber harvest in the Bradfield on Outfitting and Guiding operations. There is limited information on the use of the Bradfield and only speculation about how that use might be affected by the visibility of harvest or roads. Therefore, a "worst case" scenario was modeled using what little information could be gathered. Phone or personal conversations were held with eight of the 21 guides requesting use in the Bradfield. In addition, Forest Service use reports for 1991 and 1992 were used as a starting point for the revenue per day and number of guiding days. The assumptions and limitations of the scenario are discussed below:

1) Present outfitters charge an average of \$400 per day (based on 1991 and 1992 data). This price was multiplied by the number of predicted days. An inflation rate was not added but Present Net Value calculations discounted future values by 4%. This is a premium price per day under the "worst case" scenario and more likely reflective of big game hunting and fishing charters (present day users) than sightseeing charters (potential users) that might charge around \$200 per day (if this price is used the model values and Present Net Value would be 1/2).

2) According to conversations with outfitters, the hunting and spring fishing sectors have reduced their use of the Bradfield due to increased competition, decreased steelhead populations and regulation. This sector is expected to decrease or stabilize near current use and is not as affected by the appearance of harvest during travel. They do tend to be affected by roads or harvest in the area of hunting or fishing. The sector with the most potential for growth is the "non-consumptive" sightseeing, summer fishing, wildlife viewing and photography charters. This sector would tend to be more affected by visible harvest during travel in the Bradfield.

3) A 10% growth rate in the number of days of outfitting and guiding per year was used to predict overall growth given the assumptions above. Between 1991 and 1992 there was a 13% growth in the number of days used by permitted outfitters and guides. The number of days of recorded use in 1992 was used as the starting point for growth (1993 Forest Service use reports are not yet available). This growth rate may be inflated but was used to model a "worst case" scenario (potential maximum impact on outfitter and guides). Growth was also modeled without other variables such as competition or regulation.

4) Cumulative harvest in the viewshed of the Bradfield was assumed (all sales on the Stikine Area 10yr. action plan consisting of Campbell and Canal-Hoja). Harvest was assumed to be very visible (ie. if overstory removal harvest methods were not successful in reducing visual effects).

5) There would be a 50% decrease in the ability of guides to use the Bradfield beginning the first year of harvest operations. Some of the guides contacted felt that there would be no effect on their clients or business if harvest occurred. Two others felt it would affect their use either during the 1-2 years the sale was logged or because of the potential visible harvest. After the first year of harvest, the use would continue to grow at 10% per year. This assumes that the market would still grow as the market shifted toward clients more tolerant of activities. Also, visual recovery of the harvest unit would occur gradually over 10 years.

6) Modeling assumes that potential business is shifted out of the local area. This would likely not be the case. some clients may choose to go to other areas and the value to the economy would remain local.

Figure 4-13, Outfitter Potential Days

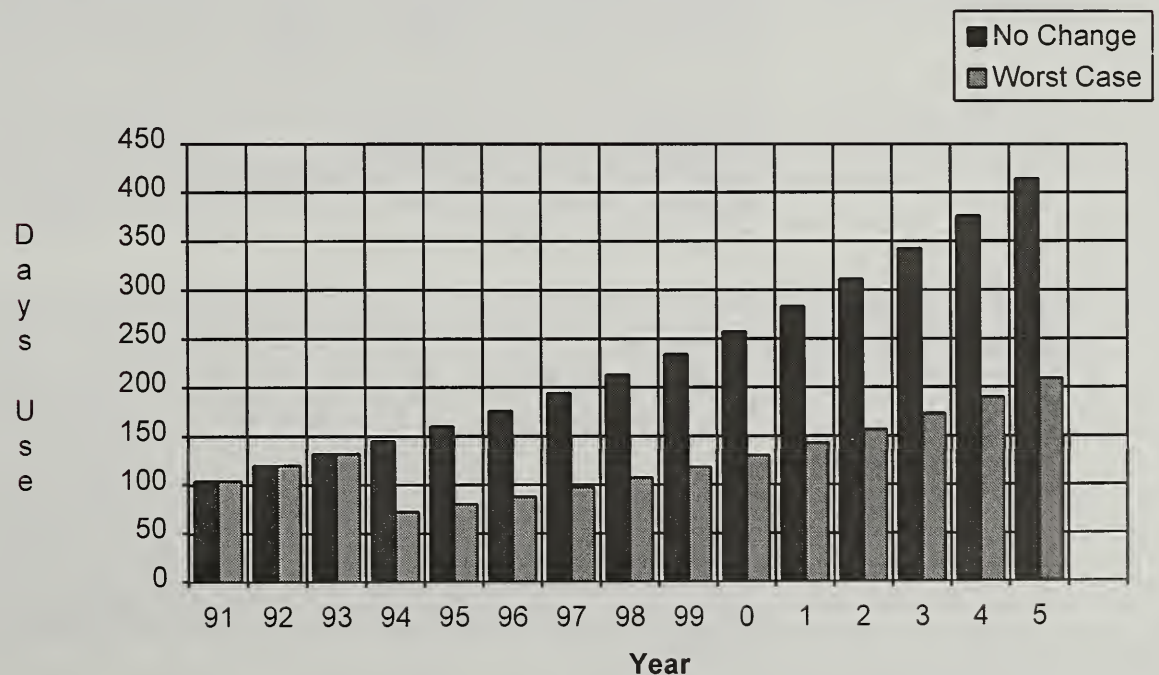
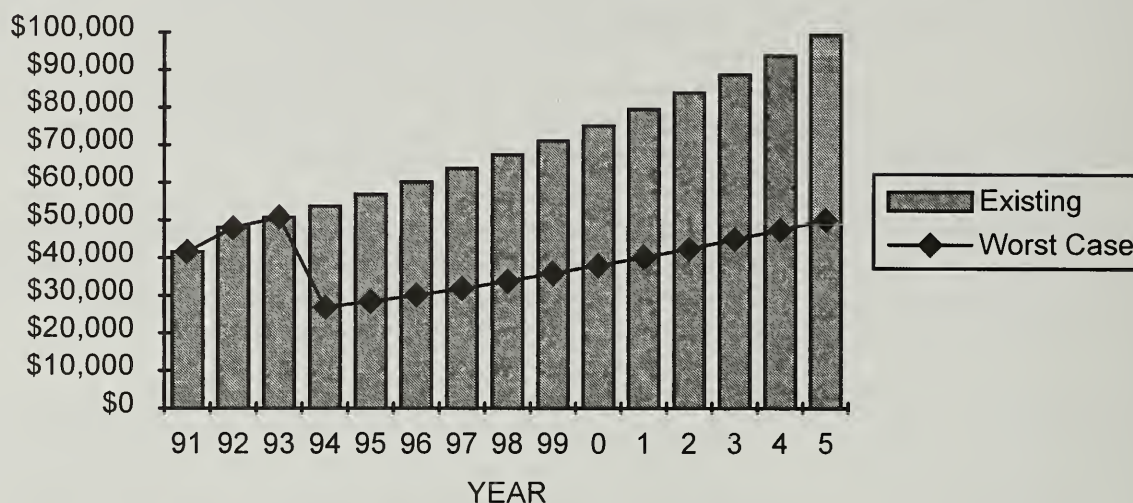


Figure 4-14, Outfitter Potential Values



"Present Net Value" (PNV) is utilized as a means to turn a stream of future income into present day dollar value so that items can be compared (a dollar today is worth more than a dollar tomorrow). The PNV of 12 years of outfitting and guiding in the Bradfield under unlimited growth at 10% per year is estimated at \$944,657 (No action, Alternative A). Under the "worst case" scenario (Alternative E) the PNV may decrease by half to \$500,940. Alternatives B and G, which have less visible activity would possibly result in less of a decrease. Alternatives D, F and P would result in a moderate decrease.

Subsistence- 810 Analysis

Section 810 of ANILCA requires a Federal agency, having jurisdiction over public lands in Alaska, to analyze the potential effects of proposed land-use activities on subsistence uses and needs. An ANILCA 810 analysis should include: an **evaluation** of the possibility of affects on subsistence uses; a distinct **finding** on whether the proposed action may significantly restrict subsistence uses; **notices and hearings** if the evaluation results in a finding that the proposed action may significantly restrict subsistence uses; and **determinations** if, following a public hearing, a finding of a significant restriction remains and the responsible official decides to proceed with the proposed project.

A significant effect on subsistence resources is not expected.

Evaluation criteria used to assess the effects of the alternatives are: (1) changes in abundance or distribution of subsistence resources, (2) supply and demand, (3) changes in access to subsistence resources, and (4) changes in competition from non-subsistence users for those resources. The evaluation determines whether subsistence uses within the analysis area or portions of the area may be significantly restricted by any of the proposed action alternatives. To determine this, the evaluation: (1) considers the availability of resources used for subsistence in the surrounding areas; (2) considers the cumulative impacts of past and reasonably foreseeable future activities on subsistence users and resources; and (3) focuses on the mapped subsistence use areas by communities with documented subsistence use within the study area.

Wildlife, fish and shellfish, marine mammals, other foods, and timber are the resources used for subsistence that are evaluated in this document. The evaluation relies heavily upon wildlife habitat capability models developed in support of the TLMP Revision and displayed in Appendices K and L of the 1991 Supplement to the Draft EIS for the Tongass Land Management Plan Revision (TLMP SDEIS).

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The results of the evaluation are expressed in the Finding. The Finding states whether or not there "may be a significant restriction" on subsistence uses. The court decision of *Kunaknana v. Watt* helped define the meaning of significant restriction as follows:

"Conversely, restrictions for subsistence uses would be significant if there were large reductions in the abundance or the major distribution of these resources, substantial interference with access to active subsistence sites or major increases in non-rural resident hunting."

In light of this definition the determination of significant restriction must be made on a reasonable basis, since it must be decided in light of the total subsistence lands and resources that are available to individuals in surrounding areas living a subsistence lifestyle.

A Finding of no significant restriction completes the Section 810 requirements. A Finding of "may cause a significant restriction" requires the proposed action be modified to remove the significant restriction, or the proposed action be dropped, or proceed with the notice and hearings.

If a hearing is necessary it will be held in the vicinity of the area involved. Notice will be given to the appropriate State agencies, local advisory committees, regional councils and the public at least 30 days before the hearing.

Determinations are necessary only if, following a public hearing, a significant restriction remains and the responsible official decides to proceed with the project. The determination will show that: (1) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands; (2) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition; and (3) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources from such action.

A full subsistence report has been written for the Campbell Timber Sale FEIS. It is too long to include here, but is available upon request. Some of the tables and figures from the full report are included in Appendix D. The following is a summary of the full report.

Wildlife Evaluation-For this evaluation the analyses consider total effects of the timber sale on estimated habitat capability for the ADF&G's Wildlife Analysis Areas (WAA). The WAA is the predominant analysis unit because it is the smallest unit for which data is available from ADF&G. Several assumptions are made for these evaluations for which Habitat Capability Models (HCM) are available: (1) HCM's are not intended to be population estimators. However, because we lack field based population estimates the HCM's provide a best current estimate of potential populations over time. The WAA estimates are from the TLMP SDEIS. (2) A certain percentage of the estimated habitat capability constitutes the supply available for harvest each year. The percentage varies by species, e.g., 10% for deer, 7% for mountain goats. (3) Historical harvest data and resource utilization gives an indication of demand. Harvest data is from various ADF&G reports. Resource utilization is supplied by various Tongass Resource Use Cooperative Survey (TRUCS) publications. (4) Demand is assumed to increase with projected population growth at 18% per decade through 2010 and 15% per decade through 2040. (5) If projected demand exceeds estimated supply the possibility of a significant restriction exists.

Abundance and Distribution of Deer-Current habitat capability represents 100% of original condition. Project analysis estimates habitat capability for the VCU at 586 deer, with a maximum reduction of 8% (alternative E) to 538 deer. The TLMP SDEIS estimates a current habitat capability of 812 deer for the WAA with a maximum reduction of 7% to 759 deer by 2040 for the TLMP preferred alternative. The estimated deer supply available for annual harvest for the WAA would range from 81 currently to 76 by 2040. ADF&G (1991a) suggests that deer populations in this area are probably below habitat capability. No deer have been reported as harvested in WAA 1812. Thus, although hunter demand is something more than 0 it is not quantified. It seems likely that deer hunting may be done in this area in association with other activities such as fishing, or hunting other species.

The projected effects to deer resulting from harvesting these units are addressed in issue 4 of the FEIS. We project that 92 percent or more of the habitat capability would still remain within the study area when the projected foreseeable future effects on deer habitat are realized. Changes in local deer herd distribution are expected to be minimal. Since the area can support an annual harvest in excess of 50 deer, there should be enough to meet current as well as future demand with any of this project's alternatives and no significant restriction will result from this timber sale.

Abundance and distribution of mountain goats-Current habitat capability represents 100% of original condition. The TLMP SDEIS predicts a habitat capability of 107 goats within WAA 1812 and a 1% reduction by 2040 under the TLMP preferred alternative. Habitat capability for the project area is estimated to be 52.4 goats, representing 49% of the goat habitat capability for the WAA. ADF&G (1992b) suggests that mountain goat populations are stable to slightly increasing for all of GMU 1B.

Goat harvest in WAA 1812 has averaged 1.1 per year. It is projected that demand will double by the year 2040. Although the habitat capability estimates suggest that there would be a slight decrease in goat carrying capacity, there would still be enough remaining habitat to support an annual harvest of over 7 goats in the WAA which is more than enough to meet the projected demand.

Although goats will not likely use harvest units, there is sufficient habitat remaining, especially with Alternatives B and P, that goats should not abandon use of the West Face. Thus, changes in local goat herd distribution are expected to be minimal.

Abundance and distribution of brown bear-The TLMP SDEIS estimates brown bear habitat capability at 30 animals in WAA 1812 with no expected reductions through 2040. This population could support an annual harvest of 1.2 bears. The project DEIS predicts a maximum reduction of 4% of estimated habitat capability in the VCU. ADF&G (1991b) considered brown bear populations in the area to be stable. Annual harvest of brown bears in the WAA has averaged 0.4 bears per year. Demand is expected to double by the year 2040. None of the proposed alternatives would reduce the carrying capacity below a level capable of supporting this demand.

Brown bears will likely continue to use the watershed if anadromous fish runs are maintained and roads are closed. Mitigations in place for this sale are intended to meet these conditions. Thus, changes in brown bear distribution and abundance are expected to be minimal.

Abundance and distribution of black bear-Current habitat capability represents 100% of original condition. ADF&G (1992a) estimates current black bear populations in the area are high. Black bear harvest has averaged 0.4 per year in the WAA. Demand is expected to double by the year 2040. Changes in black bear distribution and abundance are expected to be minimal as a result of the proposed alternatives and any reasonably foreseeable future actions.

Abundance and distribution of furbearers-Current conditions in the study area represent 100% of habitat capability. The ADF&G (1991c) sees no indication that there are any population problems in the area at present. Marten harvest has averaged 4.1 per year and otter harvest has averaged 0.75 per year in the WAA. Demand for both species is expected to double by the year 2040.

Otters predominantly use the saltwater and freshwater influence zones which will not sustain any timber harvest with this or any reasonably foreseeable future harvests in the WAA. Thus, there would be no expected changes in their abundance and distribution. Although marten inhabit zones that will sustain harvest their overall abundance and distribution on the study area is not expected to change significantly.

Abundance and distribution of waterfowl-Most waterfowl species do not nest in the study area and so abundance is not related to project activities. A few Vancouver Canada geese are known to nest in the area. Several (30+) moulting, non-breeding geese and mallards were observed using some of the lakes, ponds and marshes in the study area. A few pairs of goldeneye, green-winged teal, common mergansers and red-throated loons were also observed in the study area, though in insignificant numbers. Most of these birds were in areas which would not be impacted by any of the proposed alternatives. There were some nesting geese observed immediately adjacent to Frank Creek. Most of this habitat would be protected by the 100' TTRA buffers. The TLMP SDEIS estimates that 96% of Vancouver Canada goose nesting habitat capability will be maintained in the WAA through 2040. This would not result in a significant reduction in harvestable surplus.

Cohen (1989) reports that the entire Bradfield Canal area is used for waterfowl hunting by Wrangell residents. The tidal flats of the Bradfield River are much more extensive than those in the study area and thus, are a more likely destination for waterfowl hunters.

The waterfowl habitats most often used by hunters are associated with the estuaries of Tom and Frank Creeks which should sustain little to no impacts from any of the proposed alternatives. Thus, there are no expected changes to waterfowl distribution.

Access to wildlife-Access to historical subsistence use areas is not expected to be affected by any of the alternatives. Proposed roads could improve access to areas further inland, areas which previously have not been used for subsistence hunting. However, closing the roads after the sale should substantially reduce this potential impact. Non-roaded alternatives would have no effect on access. There are no known important anchorages along the sale area that would be affected by sale activities. The remoteness of the area from population centers will remain the major factor affecting access.

Competition for wildlife-Competition would be expected to temporarily increase during actual timber harvest activities. Following completion of sale activities, no additional competition would be expected because of the relative isolation of the area from population centers. Roaded alternatives could potentially increase competition for subsistence resources in the area, although the remoteness of the area from population centers and closing the roads after the sale make this unlikely.

A substantial increase in competition for subsistence wildlife resources from non-rural community residents is not projected to result from the alternatives proposed. Nor is competition for those wildlife resources projected to increase in the foreseeable future due to activities proposed in this project. This is because the opportunity for easy and economical access to the study area by non-rural residents and out-of-state hunters is assumed to remain limited during the life of the proposed project.

Fish and Shellfish Evaluation-Fish and shellfish are important subsistence resources used by the rural residents utilizing the analysis area. The 1987 TRUCS information indicates that fish and shellfish made up 70 percent of the per-capita harvest of principle resources harvested by subsistence users in Wrangell. Per capita harvest of salmon, other finfish, and shell fish was 114 pounds for Wrangell residents in 1987. These totals do not necessarily reflect specific harvest from the study area. They also do not reflect totals harvested under subsistence regulations.

Abundance and distribution of salmon-The current abundance of salmon within the study area is assumed to reflect natural processes. This FEIS concludes that each of the action alternatives has some associated risk for impacting fish habitat within the study area. However, the use of stream buffers and the application of Best Management Practices are expected to be effective to protect fish habitat from the potential effects of the proposed action. The effects from the proposed actions for the foreseeable future are projected to be minor. Thus, the effect on the abundance and distribution of the salmon harvest for subsistence uses in the study area would be negligible. There is no reason to expect that the supply of salmon in the Bradfield Canal area is not sufficient to meet demands.

Abundance and distribution of other finfish-Other finfish include cod, halibut, rockfish, herring, hooligan, etc. The distribution and abundance of the oceanic species is expected to be affected more by natural processes and commercial fishing regulations than the proposed action. Habitats of species that use freshwater systems should be protected by the same measures used to protect salmon habitat. The action alternatives for the study area are projected to have no impact and no foreseeable future impact on other finfish habitat. Therefore, the abundance and distribution of other finfish would not be affected by the proposed activity. It is expected that the supply of other finfish will be greater than demand for the foreseeable future.

Abundance and distribution of shellfish-The present abundance and distribution of shellfish is assumed to be primarily affected by commercial harvest and natural processes. The FEIS projects that some, although not quantified, effects on habitat for crabs, clams, and other shellfish would occur due to LTF construction on the West Face and near Frank Creek. The effect on the abundance and distribution of local crabs, clams, and other shellfish is likely to be negligible. The projected effects for the foreseeable future are also projected to be negligible. It is expected that the supply of shellfish will remain greater than demand for the foreseeable future.

Access to fish and shellfish-Access to historic subsistence use areas is not projected to be affected by any of the proposed activities or development. Nor is there a significant possibility it would be affected in the foreseeable future because of the proposed activities related to this development. Access to traditional subsistence use areas by boat and foot access would remain unchanged.

Competition for fish and shellfish-The area is currently used by commercial fish and shellfish harvesters. The proposed action should not increase commercial uses. As similarly discussed concerning competition for wildlife, there may also be some increased competition for subsistence fisheries resources from timber sale operations non-resident and Alaska non-rural resident employees. However, this increase is not expected to be substantial, due to the small number of people involved, seasonal nature of activities, and the limited time frame of activities. Following sale operations, no additional competition for fish and shellfish resources would be expected.

Marine Mammals Evaluation-Abundance and distribution of marine mammals-Harbor seals are the only marine mammal in the study area available for subsistence harvest. The abundance and population trends of seals in the Bradfield Canal area are unknown but are assumed to represent natural processes. Seals were commonly seen in the area during field reconnaissance in 1992. The most likely area for human/marine mammal interface would be the LTF near Frank Creek because seal are often seen near the mouths of anadromous fish streams. Currently, there is no evidence to suggest that timber harvest and related development activities have any impact on marine mammals.

Access to marine mammals-The proposed developments and activities associated with this project would have no effect on access to marine mammals.

Competition for marine mammals-It is likely that some of the employees of the timber operations will be Alaska Natives, and thus eligible to harvest marine mammals. However, based on the small number of people that harvest seals, the broad range of area that is used to harvest seals by Wrangell residents (Cohen 1989) and the short time frame expected for sale activities it is unlikely that there will be a significant amount of competition for this resource in this area.

Other Foods Evaluation- Other foods used for subsistence include plants such as kelp, goose tongue, and a variety of berries, etc. Though other foods did not constitute a major portion of the 1987 subsistence harvest by the rural communities documented in TRUCS, they are considered subsistence resources.

Abundance and distribution of other foods- Most traditional gathering of other foods occurs near beach and estuarine areas. With the exception for the log transfer facilities no activities proposed in the alternatives would infringe upon the beach and estuarine areas. The proposed timber harvest activity would improve the availability of berries in the units in the short-term but availability would likely decrease in the long-term. No significant affect on distribution of other foods resources is expected.

TRUCS data (ADF&G 1989) indicate plants made up approximately 2% of the per capita harvest of principle subsistence resources harvested in communities closest to the analysis area. The pounds per capita ranged from 2.3 in Wrangell to 10.7 pounds in Meyers Chuck.

Access to other foods- Other foods are a relatively minor percentage of subsistence resource harvest. Access to harvest of beach greens and seaweed/kelp would not be affected by proposal activities except in the immediate vicinity of LTF's. Access to berries would likely be improved in roaded alternatives. However, other foods are typically gathered close to town (Cohen 1989). Thus, no significant affects on access to other foods are expected due to the proposed action or within the foreseeable future.

Competition for other foods- Based on the distance of the study area from population centers, it is unlikely that there will be any competition for these resources.

Timber Evaluation- The Forest Service free-use policies in Alaska for firewood and timber remain unchanged. None of the proposed alternatives for the analysis area would restrict the availability of firewood and personal use timber. Roaded alternatives could actually increase the availability of firewood and free use timber.

Cumulative Effects- This evaluation considers whether the proposed action in combination with other past and reasonably foreseeable future actions, may significantly restrict subsistence uses.

Past Activities- Within the Bradfield Canal area past activities include a timber sale in the Bradfield River drainage and the Tyee power plant and power line developments. As a result of the timber harvest in the Bradfield River habitat capability of many MIS in WAA 1813 are significantly decreased from the capabilities in 1954 (TLMP SDEIS). There are presumed impacts on fish habitat because of the past logging, but they are not quantified.

Future Activities- The Canal/Hoya timber sale is tentatively scheduled for 1996. It is located directly across the Bradfield Canal from the Campbell Timber Sale and is the only other Forest Service project currently scheduled in the Bradfield Canal area. Subsistence effects due to the Canal/Hoya sale would likely be similar to those for the Campbell Timber Sale, being an area remote from population centers. However, in general as human populations increase and areas for subsistence gathering decrease the importance of the remaining areas will likely increase.

WAA's used by Wrangell residents for harvesting deer are subject to a number of past and future timber sales. However, because WAA 1812 represents an insignificant amount of deer hunting effort and harvest, this sale will not affect overall harvest of deer by Wrangell residents. (See Table 2, Appendix D)

The potential exists for a State road connecting Wrangell with the Mainland through the Bradfield Canal area. This could potentially affect access and competition for subsistence resources in the study area. However, whether and when the road project is implemented is very speculative at this time. The effects of the road project are unrelated to the current proposed action.

The analysis of specific effects related to the potential future projects mentioned in this section are beyond the scope of this document. They would be analyzed in future environmental assessment documents prior to implementation.

Availability of Other Lands for the Proposed Action-The Tongass Land Management Plan makes the determinations on which uses are suitable for various parcels of land within the Tongass National Forest. The current TLMP has determined that the study area should be managed for timber production. The TLMP is currently undergoing revision and the alternatives being considered contain a variety of land use designations for the study area. The preferred alternative allows timber production in the study area.

Within the study area an Interdisciplinary Team considers many resources when determining where to allow harvest units. That analysis is documented in an Environmental Impact Statement.

Campbell Timber Sale FEIS Findings-The Finding is based on the evaluations summarized above on abundance and distribution, supply and demand, access and competition for harvested resources in the study area, WAA and Bradfield Canal area. The area does not seem to represent an important subsistence use area. This is probably due to its remoteness from population centers and the location of better harvest areas closer to those population centers.

A Finding of no significant restriction is in order for wildlife, fish and shellfish, marine mammals, other foods, and timber resources.

Timber Productivity

All alternatives increase timber productivity because all alternatives regenerate old-growth areas. However, each alternative varies in the number of acres of productive forest land which is regenerated.

Lack of soil disturbance with helicopter yarding may increase growth of shrubs.

Lack of soil disturbance from helicopter yarding may increase the growth of shrubs instead of trees. The growth of trees in southeast Alaska is probably most limited by the amount of light and the resulting cool soil temperatures and the major disadvantage of the overstory removal harvest method would be a reduction in growth of the regenerated stand as compared to a clearcut. However, clearcutting usually results in overstocking of trees and they must be thinned out in 15-30 years for optimal growth.

Overstory removal increases wood fiber productivity but not as much as clearcutting.

Using overstory removal methods, the new stand will be growing faster and putting on more wood fiber than the previous old growth stand. We also hope that some of the leave trees left will "release" and increase their growth. If this occurs, a multi-storied canopy will become established faster than under clearcutting.

Production of timber is based on the soils and which plants are adapted to those soils. Highly productive timber sites are those with a site index value of greater than 80, moderate productive lands from 61 to 80 and low productive lands are from 41 to 60. Lands with a site index below 40 are not considered capable of producing commercial timber. Site index is a measure of forest productivity determined by the height attained at a selected age.

Table 4-17, % of An Alternative's Harvest By Productivity Class

Alternative	% Acres High	% Acres Moderate	% Acres Low
B	70%	30	0
D	72	18	10
E	57	32	11
F	69	25	6
G	60	34	6
P	78	16	6

The significance of the above table shows that all alternatives concentrate on harvesting the more productive land. For example, 73% of acres harvested in Alternative B are located in high productivity areas. The more productive land is expected to be easier to regenerate than the low productive land. Natural regeneration is expected on the high and moderate productive lands and may occur on the low productive lands. The low productive areas will be the ones most likely to need planting to establish the next generation of trees.

Table 4-18, Volume Harvested By Alternative

Volume	ALT. A	ALT. B	ALT. D	ALT. E	ALT. F	ALT. G	Alt. P
Total MMBF	0	7.0	10.5	20.5	14.0	9.7	11.6

Table 4-19, Harvest Acres by Volume Class

Vol- ume Class	ALT A	Alt B	ALT D	ALT E	ALT F	ALT G	ALT P	Productive Forest
4	0	5	57	165	45	19	51	4,711
5	0	254	325	656	461	339	387	5,254
6	0	25	53	63	59	38	38	930
7	0	0	0	0	0	0	0	0
Total	0	284	434	884	565	396	476	10,895

Rural Area Development

The best alternative for rural development depends on the objective of the "development" and desired social conditions. There is no one preferred alternative for rural area development because each alternative emphasizes different social values. Maintaining the ability of the land to produce many goods and services may be the wisest option if you believe that diverse economies enable small towns to survive fluctuations in any one sector of the economy.

If economic value is important, Alternatives D, F and P have the most positive timber economic values while maintaining some of the existing and potential guided tourism values of the Tom Creek area. However, these alternatives have the greatest risk to changes in the scenery of the Bradfield. If fishing is important, Alternatives D and P pose less risk to the fishery resource. If maintaining future development options or wildlife values is used as the criteria, Alternatives A, B and G emerge as best. If short-term timber related jobs are the main concern, Alternative E could employ the most people in the short-term but may cost jobs in existing and future sectors of the economy. Alternative E also would change the traditional use patterns of the area by rural residents. None of the harvest proposals effect the economic viability of future roads or transmission lines in the Bradfield.

Issue Nine: Logging Camp

This issue addresses the impacts of a logging camp on recreationists and fish and wildlife resources. This topic is discussed in the context of other issues above. Since it was clear that you and others were concerned about this particular issue, we consolidated much of the above information into one place under this issue.

Recreation

Under all alternatives, there will likely be a temporary (1-2 year) effect on the recreation setting during harvest operations. Alternatives which harvest the most volume over the most area (Alternative E) will have the greatest potential to displace recreation users. Harvest operations which are concentrated and require less road building will have less effects (Alternatives B and D). Others may be attracted to the Bradfield by the logging operation and use of helicopter systems. The most affected group may be outfitters and guides who are transporting visitors expecting a primitive experience and will be confronted with a logging operation. If barges are used to log the west face under the alternatives, traffic levels in the Bradfield Canal would increase substantially.

A floating logging camp will have the disadvantage of being "seen" by the most visitors but will somewhat limit the use of the interior areas by logging personnel who also are seeking recreational opportunities during their time off.

Fish and Wildlife

A floating logging camp would likely eliminate the potential for bears having to be shot in camp for defense of life. However, roaded alternatives (B, E, F and G) would result in increased access for personnel to fish and wildlife resources. Species most affected by this increase in access would be bears, steelhead and cutthroat trout. Alternatives containing the most road, particularly Alternative E would have greater potential effects. The duration of activities would be proportional depend on the amount of road built and volume harvested. Increased opportunity for harvest of fish and game would last approximately 1-2 years after which populations could recover.

Issue Ten: Economics

The current Forest Service Handbook direction (USDA FSH 2409.18) requires an economic efficiency assessment to compare benefits and costs of proposed timber sale projects to determine if the sale would be an economic offering. For the Campbell timber sale project, this assessment was conducted by subtracting estimated logging and transportation costs (including road construction) from the pond log value for each action alternative. Pond log values represent the end-product selling value for wood products such as lumber, cants and pulp, minus the average manufacturing costs for those products, or what the log is worth at the mill before processing.

This appraisal of costs and revenues uses average timber values from 1979 through 1991.

In order to account for market fluctuations, timber end-product selling value is based on the median or mid-market average values from 1979 through 1991. This means that during the 12 years prior to the start of the Campbell analysis, 1/2 of the end product of the timber that has been removed from the Tongass has sold for more than the mid-market selling value, and 1/2 has sold for less.

Log selling values values vary with each alternative due to the different diameter limit cuts used.

The pond log selling values for the Campbell project vary between alternatives due primarily to differences in management prescriptions. Alternative D has a slightly higher value because the 16" + diameter prescription will yield a smaller percentage of grade 3 or less valuable smaller logs. Conversely, Alternative G, with a larger amount of 9" + diameter units (group selection) will produce a larger percentage of grade 3 logs.

Costs of logging and allowances for profit and risk are deducted from the selling value.

Stump to Truck costs as depicted in Table 4-20 include costs associated with felling and bucking, yarding, sorting and loading logs at the landings. Transportation costs include truck haul to an LTF, bundling, dumping, rafting and towing of completed rafts to the closest mill site. General Logging Overhead is an allowance for the operators administrative costs. Temporary Developments include the cost of temporary roads and the cost of moving equipment and camp facilities to the site. Specified Road Cost/Log Transfer Facility includes the estimated costs of constructing the mainline transportation system and the LTF necessary for each alternative. Profit & Risk is an allowance for the operator of normal efficiency to make a profit. Normal profit & risk varies by end product. The current allowance is 10% for cedar logs, 12% for sawlogs, and 18% for pulp. If a sale shows a positive net stumpage with an allowance of 60 percent of normal profit and risk, the sale is considered an economically viable offering. Often, sales are sold that do not reflect a positive net stumpage value after the Forest Service appraises the final sale using current values. This occurs if an operator feels that they can log the sale less expensively than the logging costs used in the appraisal or if they feel that timber market values will go up after they purchase the sale.

Prior to selling the sale, we would cruise the amount of timber and use current selling values and costs in the appraisal.

The results of the mid-market assessment and relative economic ranking of each alternative are displayed in Table 4-20. It is important to recognize that these values represent very preliminary approximations. Mid-market data is not used in the final appraisal to determine rates to be paid for timber, nor does it guarantee in any way a profit to the sale purchaser. Prior to the time the timber is made available to purchasers, a timber cruise and appraisal would be conducted using current selling values, costs, and normal (100%) profit and risk to determine the volume and value of timber made available for harvest.

Table 4-20, Alternative Economic Comparisons

Revenue	Alt B	Alt D	Alt E	Alt F	Alt G	Alt P
Vol (MBF)	6,997	10,480	20,463	14,001	9,703	11,606
Selling Value (\$/MBF)	281.56	290.30	285.07	285.07	280.47	256.32

Costs (\$/MBF)	Alt B	Alt D	Alt E	Alt F	Alt G	Alt P
Stump to Truck	160.04	147.94	151.00	153.52	161.77	156.45
Transportation	29.42	45.48	33.68	33.65	30.52	47.39
Gen. Logging Overhead	12	12	12	12	12	12
Temporary Development	2.86	1.91	3.03	1.43	2.06	1.72
Spec Road Cost/Log Transfer Fac.	31.16	10.88	48.09	23.71	34.22	9.82
Profit & Risk	54.90	55.54	53.79	55.06	54.80	55.81
Total Cost \$/MBF	290.38	273.75	301.59	279.37	295.37	283.19
NET STUMPAGE	-8.81	16.55	-16.51	5.90	-14.91	3.18

4 Environmental Effects

Alternatives D, P & F would result in positive economic values at mid-market levels.

Based on this preliminary analysis, Alternatives D, P and F would result in positive average stumpage values at a mid-market level and would be considered economic offerings. There are many factors affecting the net stumpage values for each of the alternatives. One major factor why Alternative D has a higher net stumpage value than F is Alternative D requires no specified road construction and the prescription requires harvesting trees at a 16 inch and greater diameter at breast height (DBH). Applying this prescription allows for a greater quality grade per log on the sale as a whole which decreases stump to truck costs and increases selling values. For Alternative F the prescriptions are a combination of 16 inch and 12 inch and greater (DBH) and specified road construction is required. Alternative P requires longer yarding distances for the units up Frank Creek therefor increasing costs over Alternative D even though they have the same transportation system development.

Alt B is marginally uneconomic at mid-market levels.

Alternative B is marginally uneconomical at 60% of normal profit & risk. This is due to the volume of timber harvested per cost of road needed to be built and high helicopter yarding costs. Alternatives E and G would be considered uneconomical offerings under the mid market assessment criteria due to road cost, cost of LTF construction and higher helicopter yarding costs.

Alternatives E and G are uneconomical offerings at mid-market levels.

The cost for each of the alternatives is affected by many factors. All costs required to deliver logs from the stump to the mill have to be considered when determining timber sale economics. These costs include activities associated with helicopter logging operation, conventional logging operation, specified road construction, temporary road construction, camp development, camp mobilization, and log transportation from landing to manufacturing site (helicopter water drops, helicopter landing drops, transporting and de-watering of logs, truck hauling, dump and raft, and water tow).

Other factors are volume per acre for each harvest unit, and total volume to be harvested. Stump to truck logging costs are affected by stand characteristics that vary by volume class and prescription (eg. number of logs/mbf, defect, grade, and species mix.) Logging costs are generally lower per MBF in higher volume class stands and in stands with higher minimum diameter-limit prescriptions.

All action alternatives require helicopter logging. Alternative E is the only alternative that requires both helicopter logging and conventional cable logging. Helicopter logging is a very expensive operation. The volume yarded per trip from the unit to the landing (maximum payload capacity) and yarding distance from the unit to the landing (cycle time) greatly affects the economic efficiency for helicopter logging. For helicopter logging to be economically feasible the value of timber, volume class, grade of logs, and yarding costs need to offset the high cost of road construction and logging.

Other Environmental Considerations

Irreversible and Irretrievable Commitments of Resources

Irreversible and Irretrievable Commitments of Resources are resources that we would impact that will not be returned or could return but only over long periods of time. For this analysis the irreversible disturbance of some types of cultural resources could occur on unknown sites, subsurface sites or even known sites when unplanned events occur.

We will use petroleum fuels and rock sources.

Use of petroleum fuels and rock sources for road and sort yard construction commits non-renewable resources. Only Alternative A has no effect on mineral resource use at this time.

Roading will reduce the amount of area for land designations requiring a natural character.

Roading the study area will irreversibly reduce the potential amount of area that could be designated as part of the Wilderness Preservation System or managed for other purposes that require natural characteristics. Roads would also commit a certain amount of acres of forest and muskeg and would eventually be converted over time to seed beds for grasses and alder. Alternative D would not have these consequences.

Some old-growth will be lost or reduced in habitat value.

Under all alternatives there will be an irretrievable loss of old growth forests unless rehabilitation occurs over a period of 250-300 years. Due to increased fragmentation, other old growth areas adjacent to units would have their habitat values reduced.

Unavoidable Environmental Effects

Although we designed mitigation measures, units and roads to avoid adverse consequences, some impacts to the environment cannot be completely mitigated and would be expected to occur.

Air quality would temporarily diminish.

Air quality would diminish on a recurring, temporary basis due to the construction of roads, timber harvest, hauling and barge traffic. Limbs and logging slask will also be burned at sortyards intermittently throughout the logging periods which will deposit minor amounts of particulate matter and smoke into the air. This will also affect the visibility in the Bradfield area during burning periods. This in turn may have a temporary effect on scenic viewing opportunities.

There are risks to soil, water and fish.

Although Best Management Practices are designed to protect soil and water, some potential for surface erosion, sediment production, channel erosion and mass movement does exist. Helicopter yarding reduces this risk considerably but road development does pose a risk of sediment production. In addition, sediment production could displace fish or result in a loss of habitat near stream crossings and temporarily affect the function of the freshwater influence zone within the ecosystem.

Human activity and habitat losses would affect wildlife and fish.

Increased human activity both during and after logging and loss of habitat would result in impacts to fish and wildlife species, particularly those populations which have low numbers or are more sensitive to the presence of people such as steelhead, cutthroat trout and brown bears. The habitat for old-growth dependent species would also be reduced. Travel corridors between old growth blocks in adjacent watersheds would also be reduced in size and fragmented which may affect the ability for individuals to disperse and genetic material to exchange among local populations of species.

Presence of the logging operation will displace other users.

Although the degree of impact varies with the alternative selected, presence of the logging operation would temporarily affect the use of the area by outfitters/guides, tourists and local recreationists. There would also be some loss of primitive and semi-primitive recreation opportunities in the study area with the roaded alternatives. The natural landscape as viewed from the Bradfield Canal could appear visually altered under some alternatives and may be noticeable to viewers. Views of travelers up the valleys would appear altered under some alternatives.

4 Environmental Effects

LTFs would have an impact on some areas of shellfish and finfish productivity.

Although we made efforts to select the best sites for Log Transfer Facilities, none of the recommended sites meet all the sitting guidelines developed by the Alaska Timber Task Force. The Frank Creek site would have the most effects to intertidal and subtidal areas and therefore have the potential to reduce the productivity of the marine zone for shellfish and finfish. The limited, one-time use and low timber volumes being handled at these sites would reduce but not eliminate these effects. This effect combined with the presence of logging personnel could temporarily impact the use of the area by commercial fishermen.

Most of these effects are relatively short term in nature (1-3 years) and only temporarily affect existing ecosystem functions. Others such as the loss of old-growth habitats and impacts to populations of bears and fish from harvest resulting from increased human access will be long-term and could affect species diversity in the study area.

Possible Conflicts With Other Land Use Objectives

The regulations for implementing the National Environmental Policy Act (NEPA) require us to determine if there are possible conflicts between the proposed action and the objectives of federal, state and local land use plans, policies and controls of the area. The major land use regulations of concern are the Coastal Zone Management Act (CZMA) and the State of Alaska's Forest Practices Act.

Coastal Zone Management Act (CZMA)- This act requires us to ensure that the activities proposed are consistent to the maximum extent practicable with the approved State coastal management program. We will use comments from the State to this Draft EIS to evaluate the alternatives and ensure that the activities proposed are consistent to the maximum extent possible with this program.

State of Alaska Forest Practices Act- This revised act is the standard used in evaluating timber harvest activities on Federal lands for the purposes of determining consistency with the Alaska Coastal Zone Management Program (ACMP, see above). It also calls for minimum 100-foot buffers on all Class one streams which reinforces the importance of these streams which are already protected under the Tongass Timber Reform Act. This act goes on to further protect those Class II streams which flow directly into Class I streams. Currently the Alaska State Division of Governmental Coordination (ADGC) and the Forest Service are revising a Memorandum of Understanding which will establish policies and procedures for coordinating State review of our programs and activities covered by the Forest Practices Act and the Alaska Coastal Management Program. Again, comments to this document, coordinated by ADGC will serve as the review of our practices to ensure consistency with the State Forest Practices Act.

Historic and Cultural Resources

The goal of the cultural resource management Program is to preserve significant cultural resources in their field setting and ensure that they remain for future research, cultural purposes and education. The direct, indirect and cumulative effects of the alternatives have been evaluated in this Chapter. There are adequate standards, guidelines and procedures to protect cultural resources and meet the above goals.

**Effects on
Consumers, Civil
Rights, Minorities
and Women**

The effects of the alternatives on consumers is reflected in the discussion of the various goods and services supplied as a result of the proposed actions (See Issue #8, this Chapter). Other analysis in this section which is pertinent to the effects on minorities are discussed as part of the cultural resource and subsistence sections.

Chapter 5

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List of Preparers

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Chapter 6

List of Document Recipients

Listing of Document Recipients

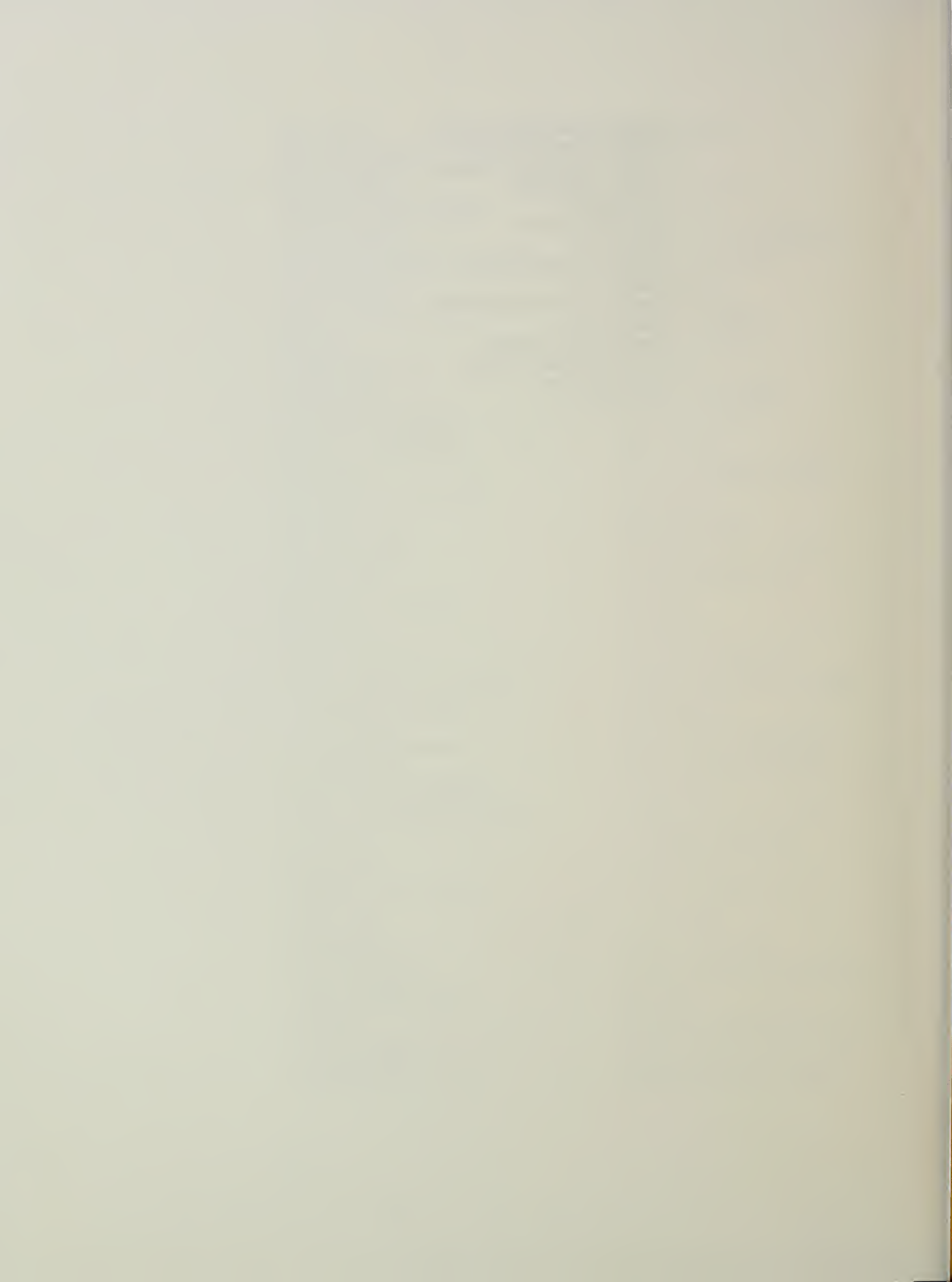
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ADEC/SERO	Concerned Citizens
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AK Dept Fish & Game(Wrangell)	CRI Helicopters
AK Dept Fish & Game, Subsistence	Peter Crimp
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 SE AK Conservation Council
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 Richard Strauss
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 The Wilderness Society
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 US Dept Commerce, NOAA
 (Juneau)
 US Dept Commerce, NOAA
 NMFAS (Auke Bay)
 US EPA, Alaska Operations
 (Anchorage)
 US EPA, Alaska Operations
 (Juneau)
 US EPA, Region 10
 US Federal Agency Liaison Div
 USFS, Dir. Environmental Coord
 US Navy
 USDA, Soil Conservation Service
 USDI, Office of Environ.Affair
 USDI, F&W Service(Anchorage)
 USDI, F&W Service(Juneau)

USFS, Chugach National Forest
USFS, Tongass NF, Chatham
USFS, Tongass NF, Petersburg
Charlie P. Van Epps
Ken Vaughan
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Wings of AK Flying Service
Charles Wood
Woolly Mammoth Construction
Max Worhatch
Wrangell Light & Power
Wrangell Resource Council
Wrangell Sentinel
Ken Wyrick



Chapter 7

Glossary

Glossary

Acronyms Used in Text

ACMP	Alaska Coastal Management Program
ADF&G	Alaska Department of Fish and Game
AHMu	Aquatic Habitat Management Unit
ANSCA	Alaska Native Settlement Act of 1971
ANILCA	Alaska National Interest Lands Conservation Act of 1980
BMP	Best Management Practices
CFR	Code of Federal Regulations
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CZMA	Coastal Zone Management Act of 1976
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EVC	Existing/Expected Visual Condition
FEIS	Final Environmental Impact Statement
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Geographic Information System
GMU	Game Management Unit
HSI	Habitat Suitability Index
IDT	Interdisciplinary Team

KV	Knutsen-Vandenberg Act
LTF	Log Transfer Facility
LUD	Land Use Designation
LWD	Large Woody Debris
MBF	One Thousand Board Feet
MIS	Management Indicator Species
MMBF	One Million Board Feet
NEPA	National Environmental Policy Act of 1969
NFMA	National Forest Management Act
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
RVD	Recreation Visitor Day
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Officer
TLMP	Tongass Land Management Plan
TRUCS	Tongass Resource Use Cooperative Survey
TTRA	Tongass Timber Reform Act
USDA	United States Department of Agriculture
VCU	Value Comparison Unit
VQO	Visual Quality Objective
WAA	Wildlife Analysis Area

Terms Used in Text

Alaska National Interest Lands Conservation Act (ANILCA)

Passed by Congress in 1980, this legislation designated 14 national forest wilderness areas in southeast Alaska. In section 705(a) Congress directed that at least \$40,000,000 be made available annually to the Tongass Timber Supply Fund to maintain the timber supply from the Tongass National Forest at a rate of 4.5 billion board feet per decade. Section 810 requires evaluation of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANSCA)

ANSCA, which became law on December 18, 1971, provides for the settlement of certain land claims of Alaska natives and for other purposes.

Alpine/Subalpine Habitat

The region found on mountain peaks above conifer stands.

Beach Fringe Habitat

Habitat that occurs from the intertidal zone inland 500 feet, and islands of less than 50 acres. This habitat is especially important to marine and upland species.

Benthic Habitat

Refers to the substrate and organisms on the bottom of freshwater and marine environments.

Best Management Practices (BMP)

Land management methods, measures or practices intended to minimize or reduce water pollution. Usually BMPs are applied as a system of practices rather than a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

Biodiversity

Variety of life and its processes.

Buffer

Tongass Timber Reform Act requires that timber harvest be prohibited in an area no less than 100 feet of uncut timber in width from each side of all Class I streams and Class II streams which flow directly into Class I streams. This 100-foot area is referred to as a buffer.

Clearcut Regeneration Method

The objective of this regeneration method is to provide site conditions favorable for the establishment, growth, and management of desired species. Cool growing conditions, wet soils, strong winds, shallow rooted trees, abundant natural regeneration, and economic factors in southeast Alaska make this regeneration method the most desirable on most areas for stand establishment and management.

Commercial Fishery

Fish, shellfish, or other fishery resources taken or processed within a designated area for commercial purposes.

Commercial Forest Land

Productive forest land that is producing, or capable of producing, crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of 20 cubic feet per acre of annual growth, or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

Standard CFL: Timber that can be economically harvested with locally available logging systems such as highlead or short-span skyline.

Nonstandard CFL: Timber that cannot be harvested with locally available logging systems and would require the use of other logging systems such as helicopter or longspan skyline.

Cruise

Refers to the general activity of determining timber volume and quality.

Cultural Resources

Historic or prehistoric objects, sites, buildings, structures, and so on, that result from past human activities.

Cumulative Effects

Cumulative effects are the impacts on the environment resulting from the addition of the incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such action. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Deer Winter Range

A combination of environmental elements that support Sitka black-tailed deer under moderately severe or severe winter conditions. Usually associated with high volume old-growth stands at low elevation and south aspects.

Draft Environmental Impact Statement (DEIS)

A statement of environmental effects for a major Federal action released to the public and other agencies for comment and review prior to a final management decision. (Required by Section 102 of the national Environmental Policy Act.)

Estuarine Fringe Habitat

This habitat type is located within a 1,000-foot zone around an estuary. It is especially important for shorebirds, waterfowl, bald eagles, and other marine-associated species.

Estuary

For the purpose of this EIS, estuary refers to the relative flat, intertidal, and upland areas generally found at the heads of bays and mouths of streams. They are predominately mud and grass flats and are unforested except for scattered spruce or cottonwood.

Even-Aged Stand Management

A stand management strategy usually results in trees of one or two age classes within the stand. There are usually one or two entries which create site conditions favorable for seedling establishment. The three even-aged regeneration methods are seed tree, shelterwood, and clearcut. Stand regulation is simply managed by using one rotation age for a stand. The associated management costs are greatly reduced because of fewer harvest entries and stand treatments. Biological diversity is generally measured within the larger landscape or forest rather than within the even-aged stand.

Existing Visual Condition (EVC)

The level of visual quality or condition presently occurring on the ground. The six existing visual condition categories are:

Type I: These are areas to be untouched by human activities.

Type II: Areas in which changes in the landscape are not noticed by the average person, but they do not attract attention. The natural appearance of the landscape still remains dominant.

Type III: Areas in which changes on the landscape are noticed by the average person, but they do not attract attention. The natural appearance of the landscape still remains dominant.

Type IV: Areas in which changes in the landscape are easily noticed by the average person and may attract some attention. The natural appearance of the landscape is noticeable, it may resemble a natural disturbance.

Type V: Areas in which changes in the landscape are obvious to the average person. These changes appear to be major disturbances.

Type VI: Areas in which changes in the landscape are in glaring contrast to the natural landscape. The changes appear to be a drastic disturbance.

Fish Habitat

The aquatic environment and the immediately surrounding terrestrial environment that, combined, afford the necessary physical, biological support systems required by fish species during the various life stages.

Fish Habitat Capability

The carrying capacity or the maximum number of fish the habitat can produce. Habitat capability is measured in smolts for anadromous fish and in numbers of adult fish for resident species.

Floodplain

The lowland and relatively flat areas joining inland and coastal waters, including debris cones and flood-prone areas of offshore islands; including, at a minimum, that area subject to a 1 percent (100 year recurrence) or greater chance of flooding in any given year.

Forested Habitat

All areas with forest cover. Used in this EIS to represent a general habitat zone.

Group Selection Regeneration Method

Small groups of trees are removed to create new groups of uniform, balanced age classes within the stand. The openings are usually regenerated from seed of the surrounding trees. Age class regulation within groups is usually accomplished by removing unwanted trees when adjacent groups are harvested.

Habitat Capability

The number of healthy animals that a habitat can sustain.

Highlead Cable Logging

A method of transporting logs to a collecting point (landing) by using a power cable passing through a block fastened off the ground to lift the front ends of the logs clear off the ground while in transit.

Habitat Suitability Index

This is a value assigned to a unit land using a computerized model that relates vegetative and geographic characteristic (eg stand volume, proximity to a stream or cliff, slope, aspect, etc) to the land units value for a particular wildlife species. Values range from 0 to 1 with 1 being the best. The Habitat Capability Models used to generate HSI's were developed by interagency teams of biologists using the best available information including research results and best professional judgement.

Important Subsistence Use Area

Important Subsistence Use Areas include the "most-reliable" and "most often hunted" categories from the TRUCS survey and from subsistence survey data from ADF&G, the University of Alaska, and the Forest Service, Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

Individual Tree Selection Regeneration Method

Single trees are removed throughout the stand, and new trees are established soon after each harvest occurs. Regeneration is normally from seed of the surrounding trees. Age class distribution of a stand is regulated by frequent harvesting which removes trees from all age classes during each entry.

Inland Wetland Habitat

Lakes, beaver ponds, marsh lands, and associated grass/sedge meadows greater than 10 acres, plus a 500-foot buffer.

Interdisciplinary Team

Two or more natural resource planners who use relevant information to develop alternative design and comparison for a proposed project. The team insures the integrated use of environmental, social, and economic information is clearly presented so the best decision can be made.

Intermediate Stand Treatments

A stand management treatment which manipulates stand growth, composition, structure, or tree quality. Intermediate treatments include thinning, pruning, cleaning, weeding, liberation, release, improvement, salvage, and sanitation cutting to achieve different management objectives. These stand treatments do not attempt to obtain new tree regeneration, and they occur before the final regeneration harvest. Some treatments such as salvage cutting or commercial thinning result in the harvest of forest products.

Land Use Designation

The method of classifying land uses presented in the Tongass Land Management Plan (TLMP). Land uses and activities are grouped to define, along with a set of coordinating policies, a compatible combination of management activities. The following is a descriptio of the four classifications:

LUD I: Wilderness areas.

LUD II: These lands are to be managed in a roadless state in order to retain their wildland character, but this designation would permit wildlife and fish habitat improvements, as well as primitive recreation facilities, and road development under special authorization.

LUD III: These lands may be managed for a variety of uses. The emphasis is on managing for uses and activities in a compatible and complimentary manner to provide the greatest combination of benefits.

LUD IV: These lands provide opportunities for intensive resource use and development, where the emphasis is primarily on commodity or market resources.

Large Woody Debris (LWD)

Any piece of relatively stable woody material having a small-end diameter of at least 10 centimeters and a length greater than one meter that intrudes into the stream channel.

Log Transfer Facility

A facility that is used for transferring commercially harvested logs to and from a vessel or log raft. It is wholly or partially constructed in waters of the United States and location and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed terminal transfer facility.

Logging Camp

A temporary facility established to house industry and Forest Service personnel while timber harvest occurs in the area.

Mass Failure

The downslope movement of a block or mass of soil. This usually occurs under conditions of high soil moisture, and does not include individual soil particles displaced as surface erosion.

Mitigation

Includes avoiding an impact altogether by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Multiple Entry

More than one stand or land treatment activity during a rotation of a stand or area.

National Environmental Policy Act of 1969

An act declaring a National policy to encourage productive harmony between humans and their environment, to promote efforts which will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of humans, to enrich the understanding of the ecological systems and natural resources important to the Nation and to establish a Council on Environmental Quality.

National Forest Management Act

A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act and requires the preparation of Forest plans.

"No Action" Alternative

The most likely condition expected to exist in the future if current management direction would continue unchanged.

Old-Growth

Ecosystems distinguished by old trees and related structural attributes.

Old-Growth Habitat

Wildlife habitat managed to maintain old-growth forest characteristics through the planning period.

Overstory Removal

Removing the overstory or dominant trees from the forest while leaving smaller understory trees. In the Campbell project area trees larger than 12" or 16" would be cut.

Precommercial Thinning

An intermediate stand treatment in even-aged stands which removes immature or undesirable trees to reduce competition so remaining trees can more fully utilize site potential and remain in a healthy condition.

Proportionality

The Tongass Timber Reform Act of 1990 states: "eliminate the practice of harvesting a disproportionate amount of old-growth timber by limiting the volume harvested over the rotation in volume classes 6 and 7, as defined in TLMP and supporting documents, so that the proportion of volume harvested in these classes within a contiguous management area does not exceed the proportion of volume currently represented by these classes within the management area".

Recreation Opportunity Spectrum (ROS)

A system for planning and managing recreation resources that categorizes recreation opportunities into the following seven classes:

Primitive 1: A natural environment of fairly large size. Interaction between users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls.

Primitive 2: A natural environment of fairly large size adjacent to saltwater. Interaction between users is very low, and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use may occur at infrequent levels.

Semi-Primitive Motorized: A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed to minimize on-site controls and restrictions. Local roads used for other resource management activities may be present.

Semi-primitive Non-Motorized: A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed to minimize on-site controls and restrictions. Use of local roads for recreational purposes is not allowed.

Roaded Natural: A natural-appearing environment with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.

Roaded Modified: A natural environment that has been substantially modified particularly by vegetative manipulation. There is strong evidence of roads and/or highways. Frequency of contact is low to moderate.

Rural: A natural environment that has been substantially modified by development of structures, vegetative manipulation. Structures are readily apparent and may range from scattered to small dominant clusters. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.

Recreation Places

Identified geographical areas having one or more physical characteristics that are particularly attractive to people in recreation activities. They may be beaches, streamside or roadside areas, trail corridors, hunting areas of the immediate area surrounding a lake, cabin site, or campground.

Redd

Nest made in gravel, consisting of a depression hydraulically dug by a fish for egg deposition and then refilled with gravel.

Retention Factor

The amount of commercial forest land removed from the timber base to protect other resource values. These factors are allowances available to draw upon when meeting other resource needs and are not fixed policies to be rigidly applied by the IDT or Forest Supervisors.

Rotation

The planned number of years (approximately 100 years in Alaska) between the time that a forest stand is regenerated and its final cutting at a specified stage of maturity.

Salvage Cutting

Cutting primarily to utilize dead/down material resulting from windthrow and scattered poor risk trees that will not be marketable if left in the stand until the next scheduled harvest. Salvage sales must contain more than 50 percent by volume of dead, insect infested, or windthrown timber.

Sawlog

A log considered suitable in size and quality for producing sawn timber.

Section C Timber Sale Contract

Written contract requirements and conditions that a purchaser must adhere to during a timber sale.

Seed Tree Regeneration Method

The objective of this regeneration method is to only leave trees which will provide seed to establish the new stand. Seed trees usually have good form, produce seed, are of the desired species, and are spaced to ensure adequate seed distribution. After the new seedlings are established the seed trees can be left or harvested.

Silviculture

The branch of forestry involving the theory and practice of manipulating the establishment, composition, structure, and growth of forest vegetation. Silviculture involves the appropriate application of ecological, social, and economic principles of vegetative management to achieve resource management objectives and desired future forest conditions.

Silviculture Prescription

A written technical document which provides detailed implementation direction about methods, techniques, timing, and monitoring of vegetative treatments. A prescription is prepared after a preferred treatment alternative has been selected, but before the project is implemented. A prescription is prepared by a silviculturist who uses interdisciplinary input to best achieve established objectives, direction, and requirements for land managed by USDA, Forest Service.

Slash

Debris left over after a logging operation, ie, limbs, bark, broken pieces of logs.

Soil Hazard Areas

Mapped areas within which various soil hazards may be encountered. Hazards include mass failures and high sediment production during road construction.

Spawning Area

The available area in a stream course which is suitable for the deposition and incubation of salmon or trout eggs.

Species Diversity

The number of different species occurring in a location or under a similar environmental condition.

Stream Classification System

A means to categorize stream channels based on their fish production values. There are three stream classes on the Tongass National Forest. They are:

Class I: Streams with anadromous (fish ascending from oceans to breed in freshwater) or adfluvial (fish ascending from freshwater lakes to breed in streams) lake and stream fish habitat. Also included is the habitat upstream from migration barriers known to be reasonable enhancement opportunities for anadromous fish and habitat with high value resident sport fish populations.

Class II: Streams with resident fish populations and generally steep (often 6-15 percent) gradient (can also include streams from 0-5 percent gradient where no anadromous fish occur). These populations have limited sport fisheries values. These streams generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.

Class III: Streams with no fish populations but have potential water quality influence on the downstream aquatic habitat.

Subsistence

The term "subsistence uses" means the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal, or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resource taken for personal or family consumption; and for customary trade.

Succession

Changes over time in plant and animal populations or communities. Young, developing populations or communities usually change over time into perpetuating populations if environmental conditions do not change.

Suitability

An evaluation based upon a resource's potential use within proposed management activities.

Thousand Board Foot Measure

A method of timber measurement in which the unit is equivalent to 1,000 square feet of lumber one inch thick. It can be abbreviated Mbd, Mbm, or MBF.

Tongass Land Management Plan (TLMP)

The land allocation plan for the Tongass National Forest which serves to direct and coordinate further planning on the Forest as well as the uses carried on within the Forest on a day-to-day basis. TLMP provides management direction for a period of ten years.

Tongass Resource Use Cooperative Study (TRUCS)

A compilation of subsistence data for evaluating the effects of the Forest Service's action contemplated in the revision of the regional Tongass Land Management Plan.

Uneven-aged Stand Management

A forest stand management strategy which results in trees of at least 3 tree age classes. Relatively frequent harvest entries remove mature and immature trees either singly (individual tree selection) or in groups (group selection). Natural regeneration usually occurs soon after each harvest entry. Intermediate stand treatments are usually performed when the harvest entry occurs. Stand regulation or management is accomplished by manipulating stand density, stand structure, species composition, re-entry periods, and maximum tree age. These manipulation variables significantly increase the complexity of intensive forest management for uneven-aged stands. Biological diversity is generally greater within an uneven-aged stand than within an even-aged stand.

V-Notch

A relatively narrow, steep, V-shaped stream channel generally on steep, mountainous terrain.

Value Comparison Unit (VCU)

A distinct geographic area that generally encompasses a drainage basin containing one or more large stream systems. Boundaries usually follow easily recognizable watershed divides. These units were established on the Tongass National Forest to provide a common set of areas for which resource inventories could be conducted and resource value interpretations made.

Visual Quality Objective (VQO)

A desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape.

Inventory VQO: Derived through application of the USDA Visual Management System. Uses three elements to determine the inventory: Sensitivity levels, distance zones, and landscape variety class. Provides a benchmark and illustrates the optimum objective based on current use patterns and sensitivity.

Adopted VQO: The VQO to be achieved as a result of management direction identified in the approved forest plan. Adopted VQO's represent the visual resource objective for the Forest Land Management Plan period, normally 10 years. (FSH 2309.22, R10 Landscape Management Handbook.)

Preservation: Management activities are generally not allowed in this setting. The landscape is allowed to evolve naturally.

Retention: Management activities are not evident to the casual forest visitor.

Partial Retention: Management activities may be evident, but are subordinate to the characteristic landscape.

Modification: Management activities may dominate the characteristic landscape but will, at the same time, use naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed as middleground (1/4 to 5 miles from viewer).

Maximum Modification: Management activities may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

Volume

Stand volume based on standing net board feet per acres by Scribner Rule.

Volume Class

Average timber stand volume, given as thousand board feet per acre. The volume classes used in this EIS are: 8 to 20, 20 to 30, 30 to 50, and 50+ MBF/acre.

Wetland

Those areas that are inundated by surface or ground water frequently enough to support vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wildlife Habitat

The locality where the species may be found and where all essentials for its development and existence are present.

Wildlife Habitat Management Unit (WHMU)

An area of wildlife habitat identified during the IDT process as having wildlife values of such importance that the habitat within the management area designated by the IDT is managed with wildlife as the primary resource value.

Windthrow (Blowdown)

Trees which the wind has blown over (windthrown) or broken the main stem (wind snap).

Chapter 8

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Literature Cited

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Chapter 9

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X, Y, Z

Appendix A

Unit and Road Cards

Appendix A

Unit and Road Cards

Introduction

Appendix A contains the following four items:

Prescriptions -- Prescriptions describe the existing resources and future treatments for harvest units. There are three prescriptions, one for each group of units being harvested under the 9", 12" and 16" overstory removal harvest method for all alternatives. These will help guide management of the units with specific recommendations for subsequent actions.

Unit Cards and Maps -- The unit cards and maps provide you with site specific information about each units location, design, harvest method, relationship to streams, eagle nest trees, terrain and other features. These cards also list any mitigation or implementation measures necessary to achieve various resource objectives.

Road Cards and Maps -- The road cards and maps provide you with site specific information about the location, design, rock pits, landings, relationship to streams, LTF's and adjacent units for each planned road system. Mitigation and implementation measures are also described. There are two sets of road cards and maps, one for each potential road system.

LTF Cards and Maps -- The Log Transfer Facility cards and maps describe the LTF's in relationship to the terrain, streams and shoreline. Rafting areas for each LTF are also shown and implementation or mitigation measures discussed.

INTEGRATED SILVICULTURE PRESCRIPTIONS for CAMPBELL TIMBER SALE

***** ECOSYSTEM DESCRIPTION *****

Stands are located on the north side of the Bradfield Canal from which the units are partially visible. No class I or II fish streams go through the units. Deer, bear, and goats utilize portions of the units, especially during the winter months. The predominate Plant Association is TSHE/VACCI with inclusions of yellow-cedar and mountain hemlock. WH mistletoe and fluting are not considered to be serious management problems. Stands are composed of 60-80% western hemlock with 10-20% spruce and minor amounts of yellow cedar and mountain hemlock in some stands. All stands are composed predominately of old growth timber. Individual or small groups of trees estimated to be larger than 30 inches in diameter were harvested overtime on areas that were accessible to yarding to saltwater by large boat. Wind is a potential problem in many areas, especially along ridges and appears to be the natural method of stand regeneration. Individual or small groups would blow down possibly damaging or knocking other trees over in the process. This pattern occurred in small patches usually under a .25 acre in size. It is estimated that less than 10% of the acreage of the units are composed of blowdown that occurred in the last 10 years. Units (and acres) within the selected Alternative covered by this Rx are 3E (20 acres), 4 (50 acres), 5 (47 acres), 6 (36 acres), 7 (60 acres), 8 (21 acres), and 21 (28 acres). This prescription applies in all alternatives that leave trees smaller than 16 inches in diameter. See Unit Cards.

***** MANAGEMENT DIRECTION *****

FOREST/PROJECT NEPA DIRECTION and DESIRED FUTURE CONDITION: The units are within VCU 510 which is a LUD IV. Unit boundaries as delineated on resource photos and maps will provide protection for wildlife and aquatic resources while utilizing renewable forest products and intensively managing young, healthy stands. This will be accomplished by leaving unmanaged stands for travel and escape corridors for wildlife, and fragile sites or buffer areas will ensure soil and aquatic resources are not damaged. Visual quality of the landscape will be maintained by leaving portions of the stand to provide an acceptable appearance. Slope stability will be ensured by maintaining some smaller diameter, more wind firm residual trees to provide rooting strength. The stands will be helicopter yarded, and managed to provide wildlife habitat, minimize abrupt visual change, maintain slope stability, and maintain healthy forest stands.

***** IMPLEMENTATION ACTIVITIES *****

VEGETATION: The stands will receive even-aged management with an extended rotation of approximately 150 years. The stand will have merchantable trees over 16 inches DBH cut and merchantable wood removed by helicopter. Residual, standing trees which are not knocked over by felling damage and are not a safety hazard will be left standing. The remaining smaller diameter standing trees will be relatively windfirm due to small crowns. These standing trees will provide adequate visual screening, wildlife habitat, and soil stability. Adequate material from the residual stand will remain on the ground to maintain site productivity and protection. On average an estimated 2-5 trees per acre are expected to release and be available for harvest at the end of the next rotation.

Future stand management will be primarily for the young stand established by natural regeneration after the harvest. Management will include precommercial thinning approximately 20 years after yarding. Thinning will leave dominant trees, including larger residual trees if they have released, and do not have fluting or mistletoe. Larger residual trees with fluting or mistletoe will be girdled and left standing to provide future snags for wildlife and insects. Spacing will be relatively wide because the next future entry will most probably be in about 150 years. Spacing of 16 to 22' between trees will provide future growing space to maintain healthy trees and soil stability, will provide

Campbell Timber Sale Rs's Continued ---

understory vegetation and stand openings for wildlife, and will provide for rapid return of forested appearance of the stands.

K-V PROJECTS: Natural regeneration exams and certification; planting SS around sort yard.

CONTRACTUAL REQUIREMENTS: Helicopter yarding, cut merchantable trees >16".

***** MONITORING PLAN *****

Visual quality will be evaluated as trees are felled to ensure adequate trees are left to prevent uniform stand appearance. Natural regeneration examinations and certifications five years after yarding. Planting certification around sort yard.

Rx Certified By: _____
Silviculturist

Sept. 29, 1993
Date

INTEGRATED SILVICULTURE PRESCRIPTIONS for CAMPBELL TIMBER SALE

***** ECOSYSTEM DESCRIPTION *****

Old growth stands are located on the north side of the Bradfield Canal from which the units are partially visible. No class I or II fish streams go through the units. Deer, bear, and goats utilize portions of the units, especially during the winter months. The predominate Plant Association is TSHE/VACCI with inclusions of yellow-cedar and mountain hemlock. WH mistletoe, WH fluting and porcupine damage are not considered to be serious management problems. Stands are composed of 60-80% western hemlock with 10-20% spruce and minor amounts of mountain hemlock in some stands. All stands are composed predominately of old growth timber. Wind is a potential problem in many areas, especially along ridges and appears to be the natural method of stand regeneration. Individual or small groups would blow down possibly damaging or knocking other trees over in the process. This pattern occurred in small patches usually under a .25 acre in size. It is estimated that less than 10% of the acreage of the units are composed of blowdown that occurred in the last 10 years. Units (and acres) within the selected Alternative covered by this prescription are 9 (17 acres), 10 (20 acres), 12 (40 acres), 15 (26 acres), 16 (20 acres), 18 (41 acres), 19 (22 acres), and 20 (30 acres). This prescription applies in all alternatives that leave trees smaller than 12 inches in diameter.

***** MANAGEMENT DIRECTION *****

FOREST/PROJECT NEPA DIRECTION and DESIRED FUTURE CONDITION: The units are within VCU 510 which is a LUD IV. Unit boundaries as delineated on resource photos and maps will provide protection for wildlife and aquatic resources while utilizing renewable forest products and intensively managing young, healthy stands. This will be accomplished by leaving unmanaged stands for travel and escape corridors for wildlife, and fragile sites or buffer areas will ensure soil and aquatic resources are not damaged. Visual quality of the landscape will be maintained by leaving portions of the stand to provide an acceptable appearance. Slope stability will be ensured by maintaining some smaller diameter, more wind firm residual trees to provide rooting strength. The stands will be helicopter yarded; and will be managed to provide wildlife habitat, minimize abrupt visual change, maintain slope stability, and maintain healthy forest stands.

***** IMPLEMENTATION ACTIVITIES *****

VEGETATION: The units will be managed as even-aged stands with an extended rotation of approximately 150 years. The longer rotation will minimize the impacts upon visual and wildlife resources while growing larger trees to improve future economic feasibility of advanced yarding systems. The stand will have merchantable trees over 12 inches DBH cut and merchantable logs removed by helicopter. Residual, standing trees which are not knocked over by felling damage will be left standing if they are not a safety hazard. The residual smaller diameter standing trees should be relatively windfirm due to their small crowns, thus minimizing the potential of soil disturbance from root upturning. The remaining trees less than 12" DBH should provide adequate visual screening, wildlife habitat, and soil stability. Adequate material from the residual stand will remain on the ground to maintain site protection and productivity. Slash at the helicopter landing will be burned to reduce porcupine habitat. Reduced soil disturbance by logging and reduced disturbance to vaccinium may result in a lower percentage of Sitka spruce natural regeneration, and porcupine damage will probably kill a number of western hemlock. Each stand will be evaluated soon after yarding to determine if planting SS is necessary to ensure adequate spruce component following precommercial thinning.

Future stand management will include precommercial thinning approximately 20 years after yarding. Thinning will leave dominant trees which do not have fluting or mistletoe, and yellow-cedar and Sitka spruce will be the preferred

CAMPBELL TIMBER SALE Rx's Continued----

leave trees. Undesirable trees over 8" DBH will be girdled and smaller undesirable trees will be cut. Spacing of 16 to 22' between trees will provide future growing space to maintain healthy trees and soil stability during an extended rotation. This wider spacing will also provide understory vegetation and stand openings for wildlife, and will provide for rapid return of forested appearance of the stands.

K-V PROJECTS: Natural regeneration exams and certification.

CONTRACTUAL REQUIREMENTS: Helicopter yarding, remove merchantable trees <12".

***** MONITORING PLAN *****

Visual quality will be evaluated as trees are felled to ensure adequate trees are left to prevent uniform stand appearance. Natural regeneration examinations and certifications five years after yarding.

Rx Certified By: _____
Silviculturist

9 / 29 / 93
Date

INTEGRATED SILVICULTURE PRESCRIPTIONS for CAMPBELL TIMBER SALE

***** ECOSYSTEM DESCRIPTION *****

Old growth stands are located on the north side of the Bradfield Canal and some of these units are partially visible. No class I or II fish streams go through the units. Deer, bear, and goats utilize portions of the units. Deer and goats may use this area during the winter months. The predominate Plant Association is TSHE/VACCI with inclusions of yellow-cedar and mountain hemlock. WH mistletoe, WH fluting and porcupine damage are not considered to be serious management problems. Stands are composed of 60-80% western hemlock with 10-20% spruce and minor amounts of mountain hemlock in some stands. All stands are composed predominately of old growth timber. Wind is a potential problem in many areas, especially along ridges and appears to be the natural method of stand regeneration. Individual or small groups would blow down possibly damaging or knock other trees over in the process. This pattern occurred in small patches usually under a .25 acre in size. It is estimated that less than 10% of the acreage of the units are composed of blowdown that occurred in the last 10 years. Units (and acres) covered by this prescription are 26 (10 acres), 28 (26 acres), 30 (12 acres), 31 (10 acres), 32 (10 acres), 34 (9 acres), 35 (13 acres), and 37 (16 acres).

***** MANAGEMENT DIRECTION *****

FOREST/PROJECT NEPA DIRECTION and DESIRED FUTURE CONDITION: The units are within VCU 510 which is a LUD IV. Unit boundaries as delineated on resource photos and maps will provide some protection for wildlife and aquatic resources while utilizing renewable forest products and intensively managing young, healthy stands. This will be accomplished by leaving unmanaged stands for travel and escape corridors for wildlife, and fragile sites or buffer areas will ensure soil and aquatic resources are not damaged. Visual quality of the landscape will be decrease somewhat but the units will be designed to blend into the landscape appearance. The stands will be cable yarded; and will be managed to provide wildlife habitat, minimize abrupt visual change, maintain slope stability, and maintain healthy forest stands.

***** IMPLEMENTATION ACTIVITIES *****

VEGETATION: The units will be managed as even-aged stands with a rotation of approximately 150 years. The longer rotation will minimize the impacts upon visual and wildlife resources while growing larger trees to improve future economic feasibility. The stand will have merchantable trees over 9 inches DBH cut and merchantable logs removed by cable yarding. Residual, standing trees which are not knocked over by felling damage will be left standing if they are not a safety hazard. The residual smaller diameter standing trees while few in number should be relatively windfirm due to their small crowns, thus minimizing the potential of soil disturbance from root upturning. These trees will be located along split lines and will provide limited screening, wildlife habitat, and soil stability. Adequate material from the residual stand will remain on the ground to maintain site protection and productivity. Slash will be left in the woods or at the cable landing. Slash at landing should be burned to reduce porcupine habitat. The mixing of the soil and the disturbance of the shrubs will favor spruce and hemlock regeneration. Porcupine damage will probably kill a number of western hemlock. Each stand will be evaluated soon after yarding to determine if planting Sitka spruce is necessary to ensure a 50% component following precommercial thinning.

Future stand management will include precommercial thinning approximately 20 years after yarding. Thinning will leave dominant trees which do not have fluting or mistletoe, and yellow-cedar and Sitka spruce will be the preferred leave trees. Undesirable trees over 8" DBH will be girdled and smaller undesirable trees will be cut. Spacing of 16 to 22' between trees will provide future growing space to maintain healthy trees and soil stability during an

CAMPBELL TIMBER SALE Rx's Continued----

extended rotation. This wider spacing will also provide understory vegetation and stand openings for wildlife, and will provide for rapid return of forested appearance of the stands.

K-V PROJECTS: Natural regeneration exams and certification.

CONTRACTUAL REQUIREMENTS: Cable yarding, remove merchantable trees <9".

***** MONITORING PLAN *****

Natural regeneration examinations and certifications five years after yarding.






Rx Certified By: _____
Silviculturist






9 / 29 / 93
Date

UNIT 1

ALTERNATIVES D, E & F



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 1 IN ALTERNATIVES D, E, F 16" OSR

Total Acres 11 Treatment Acres 11 Harvest Acres 11

16" OSR Harvest Volume 297 Harvest volume class VC6 10 VC4 1

Plant association is western hemlock/blueberry/spinulose shield fern.

DESCRIPTION: This unit is located in the saltwater facing zone and below the alpine zone. Unit 1 is in goat winter range and is located close to the alpine zone. There are no fisheries concerns in this unit. Site productivity is high.

DESIRED FUTURE CONDITION: Short term - Minimize disturbance from helicopters during mountain goat kidding and hunting seasons. Visitors to the Bradfield Canal will notice harvest units that will meet the objective of partial retention. The units will appear to have a texture change from the surrounding areas, but the change will appear natural. Straight lines and large openings will not be visible from saltwater. Maintain current human access. Unit will regenerate naturally with a predominance of hemlock and will be vigorous.

Long term - Maintain goat and deer winter range and maintain up and down slope migration corridors between goat winter range and summer range and seek to retain valuable goat winter range characteristics of snow interception in the west face of the VCU. Maintain habitat for alpine-associated wildlife species including goats and maintain migration corridors between the alpine and upland zones and between the Campbell and the adjacent drainages of Martin Creek and Harding River. Provides summer range habitat for mountain goats. Increased productivity for sawlogs and higher value products is expected. Branches and tops should return to the pre-logging condition in 20-30 years. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 12 inch limit. Unit will have a multi-storied canopy over time.






PRESCRIPTION: Unit will be managed predominately as an even-aged stand with an extended rotation of 120-150 years. Regeneration will be established by removing the overstory. Provide protection to goat kidding areas. Trees less than 16 inches in diameter will be felled only for safety. Leave as many cull trees standing as possible. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.






Other Prescriptions Considered. Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals and not meeting snow interception needs.

UNIT 2

ALTERNATIVES D, E & F



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 12 Treatment Acres 12 Harvest Acres 12
16" OSR Harvest Volume 324 Harvest volume class VC6 10 VC4 2

Plant association is western hemlock/blueberry/spinulose shield fern. Site productivity is high.

DESCRIPTION: This unit is located in the saltwater facing zone and below the alpine zone. Unit is in goat winter range and is located close to the alpine zone. There is a class III stream in the western side of the unit and there are no anticipated water quality concerns. There are no fisheries concerns for this unit. Site productivity is high.

DESIRED FUTURE CONDITION: Short term - Minimize disturbance from helicopters during mountain goat kidding and hunting seasons. Visitors to the Bradfield Canal will notice harvest units that will meet the objective of partial retention. The units will appear to have a texture change from the surrounding areas, but the change will appear natural. Straight lines and large openings will not be visible from saltwater. Maintain current human access. Unit will regenerate naturally with a predominance of hemlock and will be vigorous.

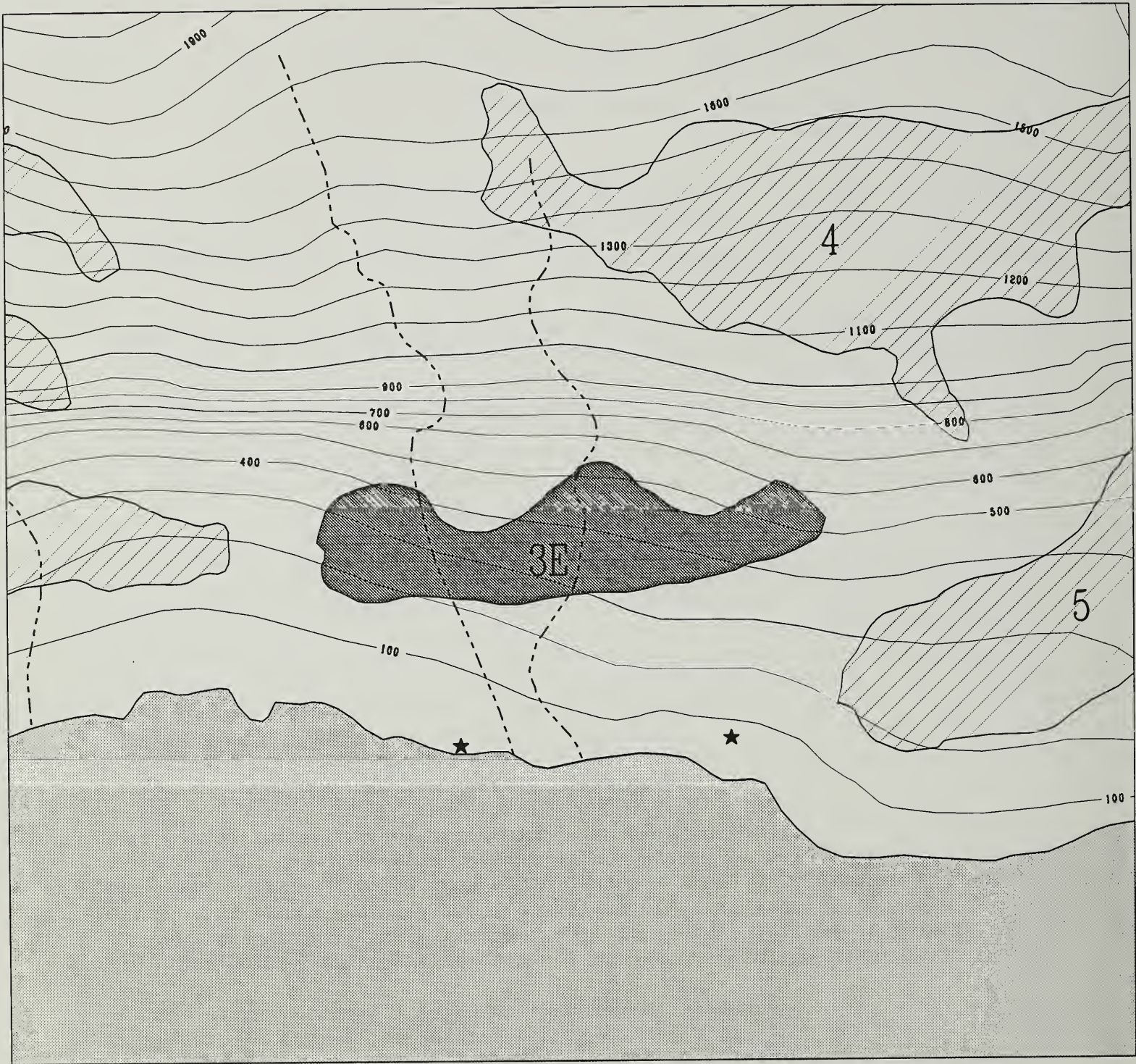
Long term - Maintain goat and deer winter range and maintain up and down slope migration corridors between goat winter range and summer range and seek to retain valuable goat winter range characteristics of snow interception in the west face of the VCU. Maintain habitat for alpine-associated wildlife species including goats and maintain migration corridors between the alpine and upland zones and between the Campbell and the adjacent drainages of Martin Creek and Harding River. Provides summer range habitat for mountain goats. Increased productivity for sawlogs and higher value products is expected. Branches and tops should return to the pre-logging condition in 20-30 years. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 12 inch limit. Unit will have a multi-storied canopy over time.

PRESCRIPTION: Unit will be managed as a predominately even-aged stand with a extended rotation of 120-150 years. Regeneration will be established by removing the overstory. Provide protection to goat kidding areas. Trees less than 16 inches in diameter will be felled only for safety. Leave as many cull trees standing as possible. Possible treatments include planting, shrub control, precommercial thinning, porcupine control and a sanitation cut.

Other Prescriptions Considered. Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals and not meeting snow interception needs.

UNIT 3E

ALTERNATIVES D, E, F, G & P



- Proposed Unit
- Proposed Adjacent Units
- Saltwater and Lakes
- TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
- Proposed Log Transfer Facility

- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Contours
- Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 3EIN ALTERNATIVES D, E, F, P 16" OSR
IN ALTERNATIVES G 9" GS

OSR Total Acres	<u>20</u>	Treatment Acres	<u>20</u>	Harvest Acres	<u>20</u>
GS Total Acres	<u>20</u>	Treatment Acres	<u>20</u>	Harvest Acres	<u>6</u>
16" OSR Harvest Volume	<u>540</u>	Harvest volume class	VC5 16 VC4 4		
9" GS Harvest Volume	<u>174</u>	Harvest volume class	VC5 6		

Plant association is western hemlock/blueberry/spinulose shield fern. Site productivity is high.

DESCRIPTION: Unit is located in the saltwater facing zone. An eagle tree is located about 650 feet to the southeast. There are two class III streams that flow through the unit. There are no fisheries concerns with this unit. Site productivity is high. In the draft units 3E and 3W were one unit and a travel corridor and exclusion was prescribed. Unit was split into 3E and 3W. There are two class III streams in the unit.

DESIRED FUTURE CONDITION: Short term - Visitors to the Bradfield Canal will notice harvest unit that will meet the partial retention visual quality objective. The unit will appear to have a texture change from the surrounding areas, but the change will appear natural. Straight lines and large openings will not be visible from saltwater. Unit will regenerate naturally with a predominance of hemlock. Maintain migration corridors up and down slope between goat winter range and summer range. No decrease in water quality.

Long term - Increased productivity for sawlogs and higher value products is expected. Western hemlock will be most numerous tree species. Stand will have trees in several age classes. In alternatives D, E, F, and P unit will provide wildlife with snow interception in winter range sooner than harvest to a 9 inch tree size. Slash from tops and limbs should return to pre-logging conditions in 20-30 years. Maintain goat and deer winter range.







PRESCRIPTION: Unit will be managed as a predominately even-aged stand with a extended rotation of 120-150 years. Establish new stand by harvesting the overstory. For alternatives D, E, F, and P trees less than 16 inches in diameter will only be felled for safety. Alternative G will harvest trees larger than 9 inches in diameter in small groups up to 2 acres in size. For any alternative selected provide an irregularly shaped unit and vary edges and backline to blend with the landscape. No harvest of timber within 500 foot of the beach. Provide protection for eagles. Fully suspend logs by helicopter yarding near stream channels (BMPs 13.6 E4; 13.9). Helicopter yarding will also minimize streambank and sideslope disturbance. Leave smaller, unmerchantable and windfirm trees and other scrub vegetation along streambanks and incised sideslopes to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16 E1). Provide category "c" protection on the stream located in the center of the unit by directionally falling trees either away from or to bridge the channel (BMPs 13.16 E3) (to minimize the addition of logging slash caused by topping, limbing, and bucking trees inside the bankfull channel); require cleanout of large pieces or large concentrations of introduced logging slash immediately after yarding of unit is completed (BMP 13.16 E5). Smaller dispersed slash (and naturally occurring debris) need not be cleaned out and may benefit channel structure and stability. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.






OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals.

UNIT 3W

ALTERNATIVES D, E, F & G



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 3WIN ALTERNATIVES D, E, F 16" OSR
IN ALTERNATIVES G 9" GS

OSR/w/EX Tot Ac	<u>24</u>	Treatment Acres	<u>24</u>	Harvest Acres	<u>24</u>
GS Total Acres	<u>24</u>	Treatment Acres	<u>24</u>	Harvest Acres	<u>9</u>
16" OSR Harvest Volume	<u>648</u>	Harvest volume class	VC5 19	VC4 5	
9" GS Harvest Volume	<u>261</u>	Harvest volume class	VC5 9		

Plant association is western hemlock/blueberry/spinulose shield fern. The productivity is high.

DESCRIPTION: Unit is located in the saltwater facing zone. An eagle tree is located about 2,000 feet to the southeast. A class III stream flows through the eastern part of the unit. There are no anticipated water quality or fisheries concerns with this unit. In the draft units 3E and 3W were one unit and a travel corridor and exclusion was prescribed. Unit was split into 3E and 3W.

DESIRED FUTURE CONDITION: Short term - Visitors to the Bradfield Canal will notice harvest unit that will meet the partial retention visual quality objective. The unit will appear to have a texture change from the surrounding areas, but the change will appear natural. Straight lines and large openings will not be visible from saltwater. Unit will regenerate naturally with a predominance of hemlock. Maintain migration corridors up and down slope between goat winter range and summer range. No decrease in water quality.

Long term - Increased productivity for sawlogs and higher value products is expected. Western hemlock will be most numerous tree species. Stand will have trees in several age classes. In alternatives D, E, and F unit will provide wildlife with snow interception in winter range sooner than harvest to a 9 inch tree size. Slash from tops and limbs should return to pre-logging conditions in 20-30 years. Maintain goat and deer winter range.







PRESCRIPTION: Unit will be managed as a predominately even-aged stand with a extended rotation of 120-150 years. Establish new stand by harvesting the overstory. For alternatives D, E, and F trees less than 16 inches in diameter will only be felled for safety. Alternative G will harvest trees larger than 9 inches in diameter in small groups up to 2 acres in size. For any alternative selected provide an irregularly shaped unit and vary edges and backline to blend with the landscape. No harvest of timber within 500 foot of the beach. Provide protection for goats. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.






OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals.

UNIT 4

ALTERNATIVES D, E, F, G & P



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 4 IN ALTERNATIVES D, E, F, P 16" OSR/w/LT
IN ALTERNATIVES G 9" GS

OSR/w/LT Tot Ac	<u>50</u>	Treatment Acres	<u>50</u>	Harvest Acres	<u>50</u>
GS Total Acres	<u>50</u>	Treatment Acres	<u>50</u>	Harvest Acres	<u>16</u>

16" OSR Harvest Volume	<u>1,350</u>	Harvest volume class	VC4 11 VC5 38 VC6 1
9" GS Harvest Volume	<u>464</u>	Harvest volume class	VC5 15 VC6 1

Plant association is 46% western hemlock/blueberry/spinulose shield fern, 40% Mountain hemlock, and 14% western hemlock-Alaska cedar/blueberry/skunk cabbage. The site productivity ranges from low to high.

DESCRIPTION: This unit is located in the saltwater facing zone and below the alpine zone. There is an eagle tree about 2,100 feet south of the unit. There is a class III stream in the western portion of the unit. There are no fisheries concerns in this unit.

DESIRED FUTURE CONDITION: Short term - Maintain up and down slope migration corridors between goat winter range and summer range and seek to retain valuable goat winter range characteristics in the west face of the VCU. Maintain habitat for alpine-associated wildlife species and maintain migration corridors between the alpine and upland zones and between the Campbell and the adjacent drainages of Martin Creek and the Harding River. Provides summer range habitat for mountain goats. Maintain current human access and minimize disturbance from helicopters during mountain goat kidding and hunting seasons. Visitors to the Bradfield Canal will notice this unit but the unit will appear natural. The unit will appear to have a texture change from the surrounding area and unit is predicted to meet partial retention visual quality objective. Straight lines and large openings will not be visible from saltwater. Unit will regenerate naturally with a predominance of hemlock in the moderate and highly productive sites.

Long term - Increased productivity for sawlogs and higher value products is expected. Two storied patchy stand. Tops and branches are expected to return to pre-logging conditions on 20-30 years.






PRESCRIPTION: Unit will be managed as a predominately even-aged stand with a extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Provide protection to goat kidding areas. For alternatives D, E, F, and P harvest trees smaller than 16 inches only for safety concerns. Alternative G will harvest trees larger than 9 inches in diameter in small groups up to 2 acres in size. For any alternative selected leave as many cull trees standing as safety permits. For alternatives D, E, F, and P leave 1 clump for each 8-12 acres to be harvested. Clumps will be scattered throughout the unit to breakup the uniform appearance and maintain diversity. Fully suspend logs by helicopter yarding near stream channels (BMPs 13.9; 13.1; 13.2). Leave smaller, unmerchantable and windfirm trees along streambanks to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16 El; 13.1). Provide protection for goats. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.






OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals and maintaining goat winter habitat.

UNIT 5

ALTERNATIVES D, E, F, G & P



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 5 IN ALTERNATIVES D, E, F, P 16" OSR/w/LT
IN ALTERNATIVES G 9" GS

OSR Total Acres	<u>47</u>	Treatment Acres	<u>47</u>	Harvest Acres	<u>47</u>
GS Total Acres	<u>47</u>	Treatment Acres	<u>47</u>	Harvest Acres	<u>18</u>

16" OSR Harvest Volume	<u>1,034</u>	Harvest volume class	<u>VC5 39 VC4 8 ac</u>
9" GS Harvest Volume	<u>450</u>	Harvest volume class	<u>VC5 18 ac</u>

Plant association is 89% western hemlock/blueberry/spinulose shield fern and 11% western hemlock-Alaska cedar/blueberry/skunk cabbage. Site productivity is moderate to high.

DESCRIPTION: This unit is located in the saltwater facing zone adjacent to the beach fringe. There are no fisheries concerns in this unit. There is an eagle tree located about 650 feet southwest of the unit. A shallowly incised stream bisects the unit in the northeastern portion of the unit. No anticipated water quality concerns with the class III stream given the yarding prescription.

DESIRED FUTURE CONDITION: Short term - Maintain migration corridors up and down slope between goat winter range and summer range. Visitors to the Bradfield Canal will notice harvest units that will meet the visual quality objective of partial retention. The units will appear to have a texture change from the surrounding areas, but the change will appear natural. Straight lines and large openings will not be visible from saltwater. Unit will regenerate naturally with a predominance of hemlock.

Long term - Increased productivity for sawlogs and higher value products is expected. Tops and branches are expected to return to pre-logging conditions on 20-30 years.

PRESCRIPTION: Unit will be managed as a predominately even-aged stand. Establish new stand by harvesting the overstory. Manage the stand for trees in several age classes with an extended rotation of 120-150 years. Provide an irregularly shaped unit boundary. Trees less than 16 inches in diameter will be felled only for safety under alternatives D, E, F, and P. Alternative G will harvest trees larger than 9 inches in diameter in small groups up to 2 acres in size. Unit is above beach fringe and will have an uncut area between unit 5 and unit 6 to allow for migration between beach fringe and upslope areas. Vary edges and backline to blend with the landscape. No harvest of timber within 500 foot of the beach. For alternatives D, E, F, and P leave 1 clump for each 8-12 acres to be harvested. Clumps will be scattered throughout the unit to breakup the uniform appearance and maintain diversity. Fully suspend logs by helicopter yarding near stream channel (BMPs 13.6 E4; 13.9). Leave smaller, unmerchantable and windfirm trees throughout unit to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16 E1;). Leave as many cull trees standing as safety permits. Provide protection for eagles. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals.

UNIT 6

ALTERNATIVES D, E, F, G & P



- Proposed Unit
- Proposed Adjacent Units
- Saltwater and Lakes
- TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
- Proposed Log Transfer Facility

- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Contours
- Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 6IN ALTERNATIVES D, E, F, P 16" OSR/w/LT
IN ALTERNATIVES G 9" GS

OSR Total Acres	<u>36</u>	Treatment Acres	<u>36</u>	Harvest Acres	<u>36</u>
GS Total Acres	<u>36</u>	Treatment Acres	<u>36</u>	Harvest Acres	<u>14</u>

16" OSR Harvest Volume	<u>828</u>	Harvest volume class	VC4 9 VC5 16 VC6 11
9" GS Harvest Volume	<u>350</u>	Harvest volume class	VC6 11 VC5 3

Plant association is 59% western hemlock/blueberry/spinulose shield fern, 17% western hemlock-Alaska cedar/blueberry/skunk cabbage, and 24% Sitka spruce. The site productivity ranges from moderate to high.

DESCRIPTION: This unit is located in the saltwater facing zone adjacent to the beach fringe. There are two class III streams in and one east of the unit. They have been scoured by historic debris torrents and have a boulder and large cobble substrate with little or no woody debris. There are no fisheries concerns in the unit. Fisheries concerns are associated with sort yard and log transfer site. Sort yard is adjacent to unit. See LTF card for Miner's Creek.

DESIRED FUTURE CONDITION: Short term - Maintain migration corridors up and down slope between goat winter range and summer range. Visitors to the Bradfield Canal will notice harvest units that will meet the visual quality objective of partial retention. The units will appear to have a texture change from the surrounding areas, but the change will appear natural. Straight lines and large openings will not be visible from saltwater. Unit will regenerate naturally with a predominance of hemlock.

Long term - Increased productivity for sawlogs and higher value products is expected. Tops and branches are expected to return to pre-logging conditions on 20-30 years.

PRESCRIPTION: Unit will be managed as a predominately even-aged stand with a extended rotation of 120-150 years. Establish new stand by harvesting the overstory. New stand will have trees in several age classes with multi-storied canopy layers. Provide an irregularly-shaped unit boundary. Under alternatives D, E, F, and P trees less than 16 inches in diameter will be felled only for safety. Alternative G will harvest trees larger than 9 inches in diameter in small groups up to 2 acres in size. Unit is above beach fringe and will have an uncut area between unit 6 and units 5 and 7 to allow for migration between beach fringe and upslope areas. Vary edges and backline to blend with the landscape. No harvest of timber within 500 foot of the beach. Locate unit boundary at or above the slope break of the channel flowing north to south (BMPs 13.2; 13.3). Fully suspend logs by helicopter yarding near stream channels (BMPs 13.6 E4; 13.9;). Leave smaller, unmerchantable and windfirm trees along streambanks and incised v-notch sideslopes to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16 E1). Leave 1 clump of trees uncut for each 8-12 acres harvested. Clumps will be scattered throughout the unit to breakup the uniform appearance and maintain diversity. Leave as many cull trees standing as safety permits. At and south of the union of the stream channels on the east side of the unit leave a selective buffer of trees about 50 feet wide to help maintain bank stability (BMP 12.6a). South bank of creek may need to be armored to maintain bank stability. Marking of trees will involve sale administration, hydrology, and fisheries. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals.

UNIT 7

ALTERNATIVES D, E, F, G & P



- Proposed Unit
- Proposed Adjacent Units
- ▨ Saltwater and Lakes
- ▨ TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
- ▨ Proposed Log Transfer Facility

- ~ Class 1 Streams
- ... Class 2 Streams
- - - Class 3 Streams
- ~ Contours
- - - Proposed Roads

Scale: 1 inch = 660 feet

OSR Total Acres	<u>60</u>	Treatment Acres	<u>60</u>	Harvest Acres	<u>60</u>
GS Total Acres	<u>60</u>	Treatment Acres	<u>60</u>	Harvest Acres	<u>21</u>
16" OSR Harvest Volume	<u>1,500</u>	Harvest volume class	<u>VC5 60 ac</u>		
9" GS Harvest Volume	<u>567</u>	Harvest volume class	<u>VC5 21 ac</u>		

The plant association is 18% western hemlock/blueberry/spinulose shield fern, 57% western hemlock-Alaska cedar/blueberry/skunk cabbage, and 25% mountain hemlock. Site productivity ranges from low to high.

DESCRIPTION: This unit is located in the saltwater facing zone adjacent to the beach fringe. There are no fisheries concerns in this unit. There are two class III streams in the unit. The stream labeled 3 was scoured in the winter of 1993 by a debris torrent and was seeded in July.

DESIRED FUTURE CONDITION: Short term - Maintain migration corridors up and down slope between goat winter range and summer range. Visitors to the Bradfield Canal will notice harvest units that will meet the visual quality objective of partial retention. The units will appear to have a texture change from the surrounding areas, but the change will appear natural. Straight lines and large openings will not be visible from saltwater. Unit will regenerate naturally with a predominance of hemlock.

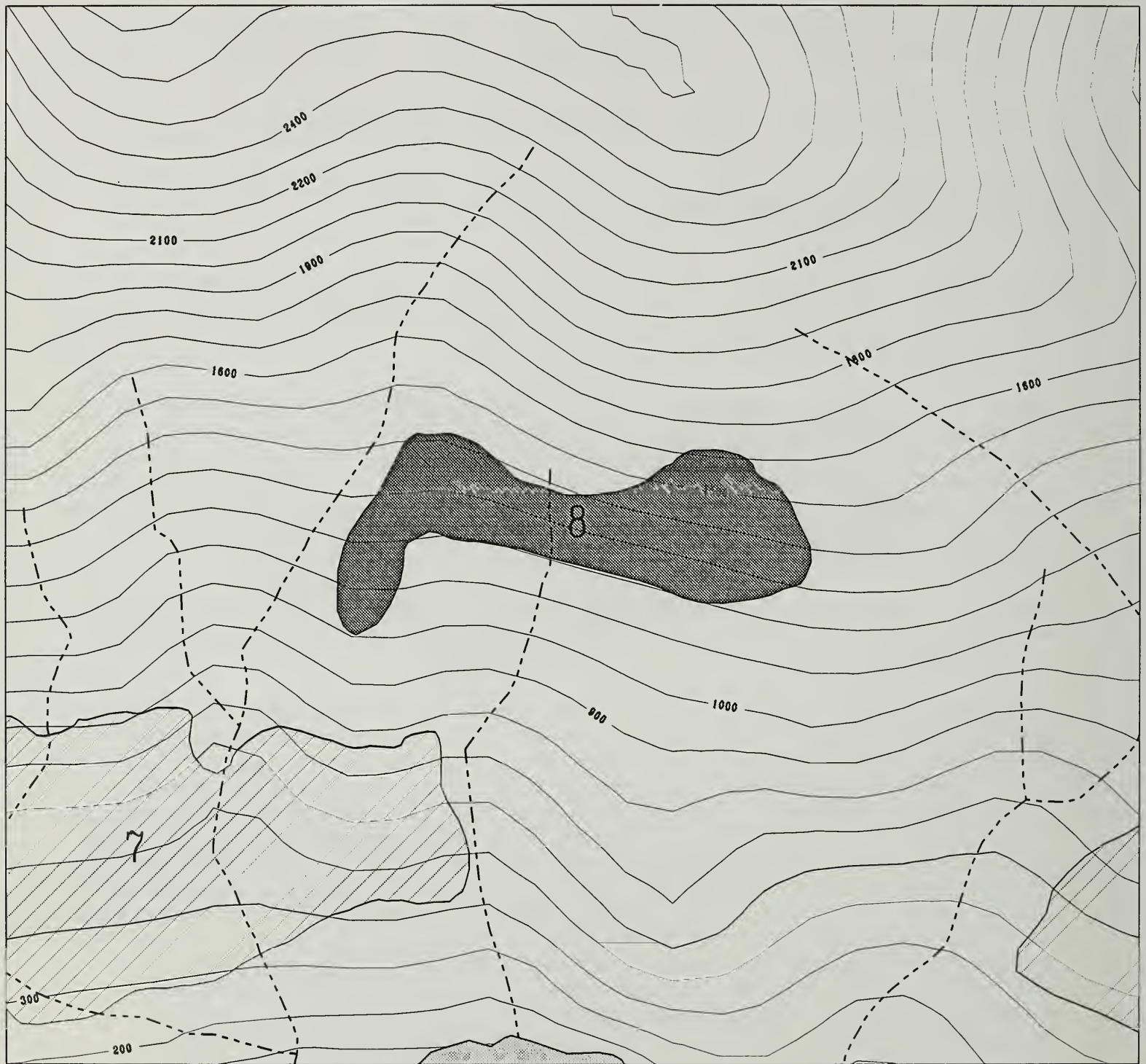
Long term - Increased productivity for sawlogs and higher value products is expected. Tops and branches are expected to return to pre-logging conditions on 20-30 years.







PRESCRIPTION: Unit will be managed as a predominately even-aged stand with a extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Manage the stand with trees in several age classes and a multi-storied canopy layers. Provide an irregularly shaped unit boundary. Under alternatives D, E, F, and P trees less than 16 inches in diameter will be felled only for safety. Alternative G will harvest trees larger than 9 inches in diameter in small groups up to 2 acres in size. Unit is above beach fringe and will have an uncut area between unit 7 and unit 6 to allow for migration between beach fringe and upslope areas. Vary edges and backline to blend with the landscape. No harvest of timber within 500 foot of the beach. Locate unit boundary at or above slope break on channels labeled "1" and "4" (BMPs 13.2; 13.3). For stream labeled "3" directionally fall trees either away from channel or to bridge channel to minimize the addition of logging slash to channel from topping, limbing and bucking trees inside the bankful channel. Similarly, directionally fall trees into unit as practical near boundary on channel "4" (BMP 13.16 E3). Large pieces or large concentrations of introduced logging slash shall be removed immediately after yarding is completed (BMP 13.15 E6) and provide category "c" stream protection for streams 3 and 4. Helicopter yarding will provide full suspension for entire unit so stream channels and streambanks will be protected (BMPs 13.6, E4, 13.9). Leave smaller, unmerchantable and windfirm trees and other vegetation along all streambanks and incised sideslopes to maintain soil stability through rooting strength by application of overstory removal prescription (BMP 13.16, E1). Leave 1 clump of trees uncut for each 8-12 acres harvested and as many cull trees standing as safety permits. Clumps will breakup the uniform appearance and maintain diversity. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.






OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals.

UNIT 8

ALTERNATIVES D, E, F, G & P



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 8IN ALTERNATIVES D, E, F, P 16" OSR
IN ALTERNATIVES G 9" GS

OSR Total Acres	<u>21</u>	Treatment Acres	<u>21</u>	Harvest Acres	<u>21</u>
GS Total Acres	<u>21</u>	Treatment Acres	<u>21</u>	Harvest Acres	<u>8</u>
16" OSR Harvest Volume	<u>483</u>	Harvest volume class	<u>VC5 21 ac</u>		
9" GS Harvest Volume	<u>200</u>	Harvest volume class	<u>VC5 8 ac</u>		

The plant association is 72% western hemlock/blueberry/spinulose shield fern and 28% mountain hemlock. Site productivity is either low or high.

DESCRIPTION: This unit is located in the saltwater facing. There is a class III stream in the middle of the unit and one outside of the west boundary. There are no fisheries concerns in this unit.

DESIRED FUTURE CONDITION: Short term - Maintain migration corridors up and down slope between goat winter range and summer range. Visitors to the Bradfield Canal will notice harvest units that will meet the visual quality objective of partial retention. The units will appear to have a texture change from the surrounding areas, but the change will appear natural. Straight lines and large openings will not be visible from saltwater. Unit will regenerate naturally with a predominance of hemlock in the areas of high productivity.

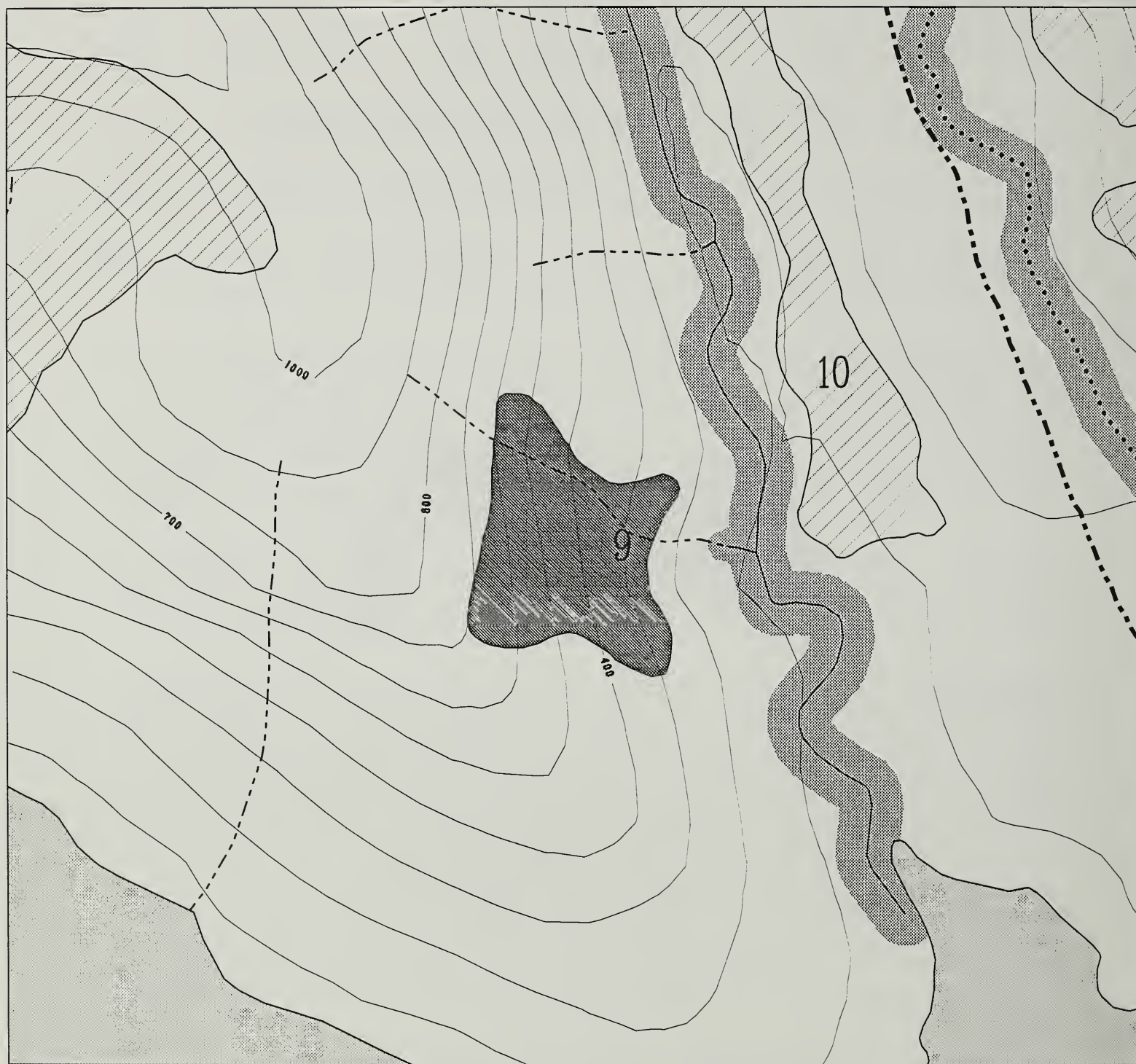
Long term - Increased productivity for sawlogs and higher value products is expected. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Tops and branches are expected to return to pre-logging conditions on 20-30 years. Multi-storied stand.







PRESCRIPTION: Establish new stand by harvesting the overstory and manage as predominately an even-aged stand with an extended rotation of 120-150 years. Under alternatives D, E, F, and P trees less than 16 inches in diameter will be felled for safety. Alternative G will harvest trees larger than 9 inches in diameter in small groups up to 2 acres in size. Provide protection for goats. Leave as many cull trees standing as safely possible. Locate unit boundary 50 to 100 feet or more above the slope break of the deeply incised v-notch channel along the outside of the west boundary (BMPs 13.2; 13.3). Fully suspend logs by helicopter yarding near stream channels (BMPs 13.1; 13.2; 13.9). Leave smaller, unmerchantable and windfirm trees along streambanks and incised sudeslopes to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16 E1). Provide protection for goats. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.






OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals.

UNIT 9

ALTERNATIVES B, D, E, F, G & P



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE UNIT 9

IN ALTERNATIVES D, 16" OSR
IN ALTERNATIVES B, E, F, G, P 12" OSR

Total Acres	<u>17</u>	Treatment Acres	<u>17</u>	Harvest Acres	<u>17</u>
16" OSR	Harvest Volume	<u>459</u>	Harvest volume class	VC6 15 VC5 2	
12" OSR	Harvest Volume	<u>476</u>	Harvest volume class	VC6 15 VC5 2	

Plant association is western hemlock/blueberry/spinulose shield fern. The site productivity is high.

DESCRIPTION: This unit is located in the saltwater facing zone. A small class III stream flows through the northeast part of the unit. Frank Creek is about 300 feet east of the unit. There is an eagle tree about 2,100 feet south of the unit.

DESIRED FUTURE CONDITION: Short term - The unit will meet the visual quality objective of partial retention and unit will appear to have a texture change from the surrounding areas, but the change will appear natural. Straight lines and large openings will not be visible from saltwater. Future stand to appear irregular, patchy and have at least two different stories composed mainly of western hemlock. A naturally regenerated unit, predominantly with hemlock, is expected. Natural variation in water quality not exceeded.

Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Red or yellow cedar as only a minor component. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years. Channel complexity and biodiversity of Frank Creek maintained.







Prescription: Unit will be managed predominately as an even-aged stand with an extended rotation of 120-150 years. Overstory removal will establish natural regeneration. Provide an irregularly shaped backline. Depending upon the alternative selected trees less than 12 or 16 inches in diameter will be felled only for safety. Fully suspend logs by helicopter yarding near stream channels (BMPs 13.16 E4; 13.9). Leave smaller, unmerchantable and windfirm trees along streambanks to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16; E1). Locate unit boundary to ensure no harvest of timber within 500 feet of the beach or 1,000 feet of the estuary, or within 100 feet of the flood plain on Frank Creek. If alternative D or E is selected leave clumps of trees within the unit. Locate northern boundary at or above the slope break to incised v-notch flowing southeast (BMPs 13.2; 13.3). Leave as many cull trees standing as safely possible. Provide protection for geese. Other possible treatments include planting, shrub control, precommercial thinning, porcupine control and a sanitation cut.






Other Prescriptions Considered. Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting visual objectives.

UNIT 10

ALTERNATIVES B, D, E, F, G & P



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

12" Total Acres	<u>20</u>	Treatment Acres	<u>20</u>	Harvest Acres	<u>20</u>
16 "Total Acres	<u>20</u>	Treatment Acres	<u>20</u>	Harvest Acres	<u>20</u>
12" Overstory Removal	<u>500</u>	Harvest volume class	VC5 19	VC6 1	
16" Overstory Removal	<u>440</u>	Harvest volume class	VC5 19	VC6 1	

The plant association is 25% western hemlock/blueberry and 75% western hemlock. The site productivity is moderate to high.

DESCRIPTION: This unit is located in the fresh water influence zone. Unit is located between a class I stream and a muskeg ridge top. The slope above Frank Creek contains sensitive ravines, underlain with fine textured deposits, which can be harvested with light trafficking afforded by helicopter yarding. There is an eagle tree about 2,600 feet south of the unit.

DESIRED FUTURE CONDITION: Short term - Provide high-quality habitat for fish and riparian-associated wildlife species including Vancouver Canada goose nesting habitat, brown bear bedding areas and travel zones for bears and other wildlife. No decline in channel/soil stability. Maintain stable stream banks and a future supply of large woody debris. No measurable decline in water quality in terms of fish habitat complexity of Frank Creek. This unit is unseen from the Bradfield Canal and would be seen from Frank Creek. Little change of the visual character of the fresh water influence zone. Texture change and form shape will not be visible and will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.

Long term - Increase productivity for sawlogs and higher value products.







PRESCRIPTION: Establish new stand by harvesting the overstory and manage as predominately an even-aged stand with an extended rotation of 120-150 years. Depending upon the alternative selected trees less than 16 or 12 inches in diameter will be felled only for safety. No harvest of timber within 1,000 feet of the estuary, or within 100 feet of the flood plain for Frank Creek (BMP 12.6). Leave as many small trees standing as safely possible to help maintain soil stability through rooting strength (BMP 13.16 E1) particularly along the small ravines in the unit. Helicopter yarding will provide full suspension for entire unit (BMPs 13.6 E4; 13.9). Locate unit boundary above the slope break to avoid the ravine south of the unit (minor rill development in ravine)(BMPs 13.2; 13.3) and maintain the 100 foot buffer on Frank Creek (BMP 12.6). Buffer stability may be enhanced by the residual stand in the unit because of the overstory removal silvicultural prescription (BMP 12.6a). Provide protection for geese. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.






OTHER PRESCRIPTIONS CONSIDERED. Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of wildlife, soil and water protection.

UNIT 12

ALTERNATIVES B, E, F, G & P



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE UNIT 12 IN ALTERNATIVES B, E, F, G, P 12" OSR/w/LT

Total Acres 40 Treatment Acres 40 Harvest Acres 40

12" OSR Harvest Volume 1,040 Harvest volume class VC5 40

Plant association is western hemlock/blueberry/spinulose shield fern. Site productivity is high.

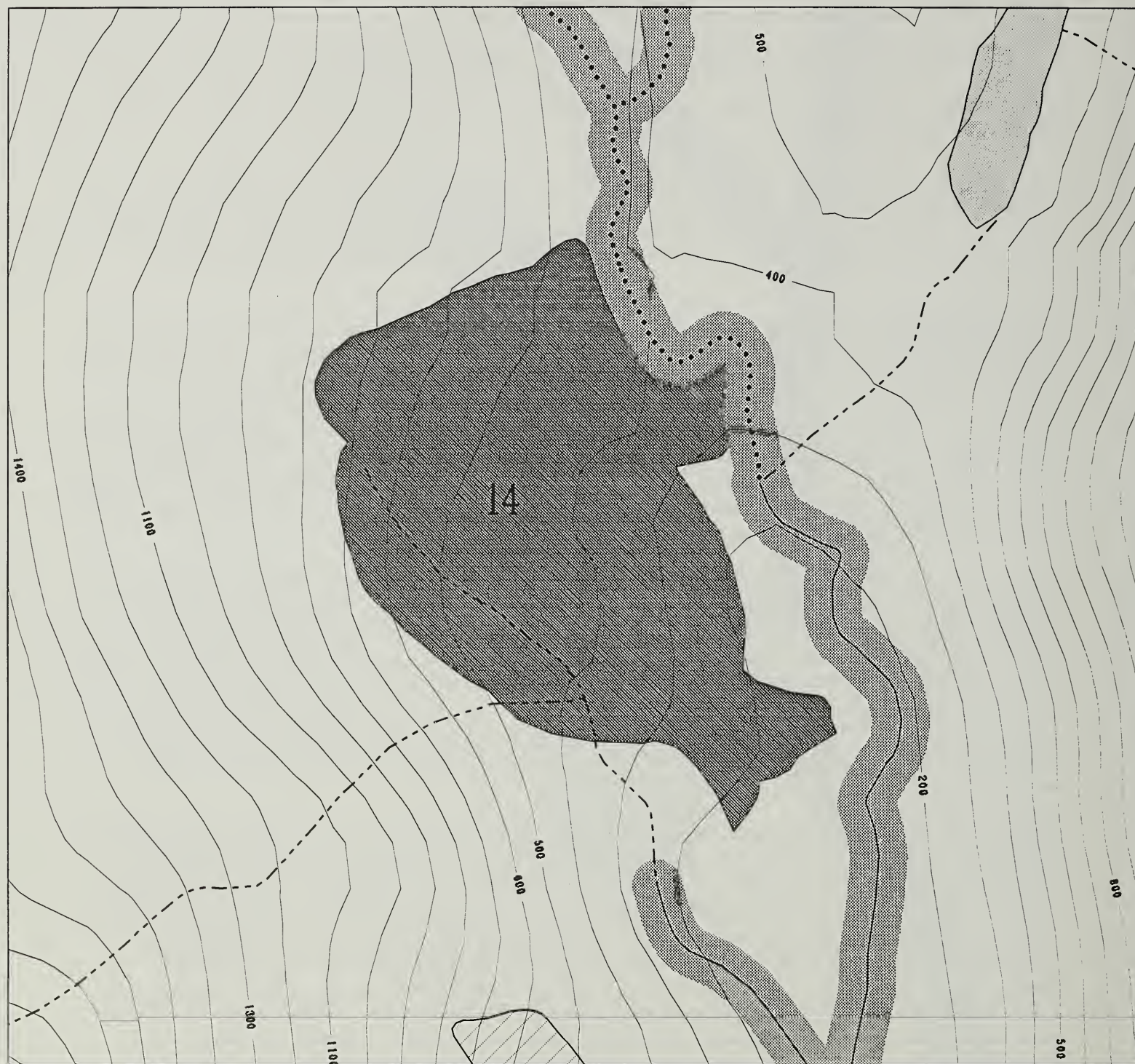
DESCRIPTION: This unit is located in the upland interior zone. Unit is located about 250 feet above Frank Creek, a class I stream. Frank Creek basin contains sensitive ravines underlain with fine textured deposits. There are two class III streams the flow through the unit and merge at the eastern boundary.







DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of large forest block, maintain wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. Unit will appear natural from the Bradfield canal. From Franks Creek visitors will see a more modified landscape. Provide nesting habitat, brown bear bedding areas and channel/soil stability. No decline in slope stability. No measurable decline in water quality. Similar or improved access for humans. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Red or yellow cedar as only a minor component. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years. Retain some large trees for genetic, visual and structural diversity. Channel complexity and biodiversity of Frank Creek maintained.

PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Harvest trees smaller than 12 inches in diameter only for safety. Fully suspend logs by helicopter yarding near stream channels (BMPs 13.6 E4; 13.9). Leave smaller, unmerchantable and windfirm trees along streambanks to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16 E1). Leave scattered larger trees along the east boundary for bear denning and structural diversity. Vary back line to make west boundary not appear straight from saltwater. Leave as many cull trees standing as safely possible. Locate boundary to provide at least a minimum 100 foot buffer from floodplain of Frank Creek (BMP 12.6). Buffer stability may be enhanced by the residual stand in the unit because of the overstory removal silvicultural prescription (BMP 12.6a). Provide protection for geese. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut. Yarding corridors through buffer, if needed, will coincide with geomorphic control features (rapids, cascades, bedrock) of channels. Location will be determined with input from fisheries and hydrology.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of wildlife, soil and water protection and visual appearance.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 73Treatment Acres 73Harvest Acres 7312" OSR Harvest Volume 1,752Harvest volume class VC5 73

Plant association is 18% western hemlock/blueberry and 82% western hemlock-Alaska cedar/blueberry. Site productivity is moderate.

DESCRIPTION: This unit is located in the upland interior zone. Unit is located west of Frank Creek, a class I stream. Streams flowing through the western portions of unit will be given class III protection as required in timber sale contract. For stream in west northwest portion of unit no anticipated water quality concerns.







DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of large forest blocks and maintain wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. Unit will appear natural from the Bradfield canal. From Frank Creek visitors will see a more modified landscape. Provide goose nesting and brood rearing habitat, brown bear bedding areas and channel/soil stability. No decline in slope stability. No measurable decline in water quality for fish habitat. Similar or improved access for humans. Texture change and form shape will be visible but will not dominate the view.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years. Retain some large trees for genetic, visual and structural diversity. Provide buffer 100 feet from edge of alluvial fan to protect Class I stream near southeast tip of unit.

PRESCRIPTION: Unit will be managed as a predominately even-aged stand with a extended rotation of 120-150 years. Harvest trees smaller than 12 inches in diameter only for safety. Provide section c protection for class III streams. Leave some larger trees along the east boundary for wildlife and bear denning and leave as many cull trees standing throughout the unit as safely possible. In south southeast portion of unit stream crosses landform with alluvial bank control (BMPs 13.2 E3; 13.3 E3). Locate boundary on east side of unit at least 100 feet from Frank Creek floodplain (BMP 12.6). Provide protection for geese. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of wildlife, soil and water protection and visual appearance.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 26 Treatment Acres 26 Harvest Acres 2612" OSR Harvest Volume 546 Harvest volume class VC3 1 VC4 2 VC5 23

Plant association is 85% western hemlock/blueberry/spinulose shield fern and 15 % western hemlock/blueberry. Site productivity ranges from moderate to high.

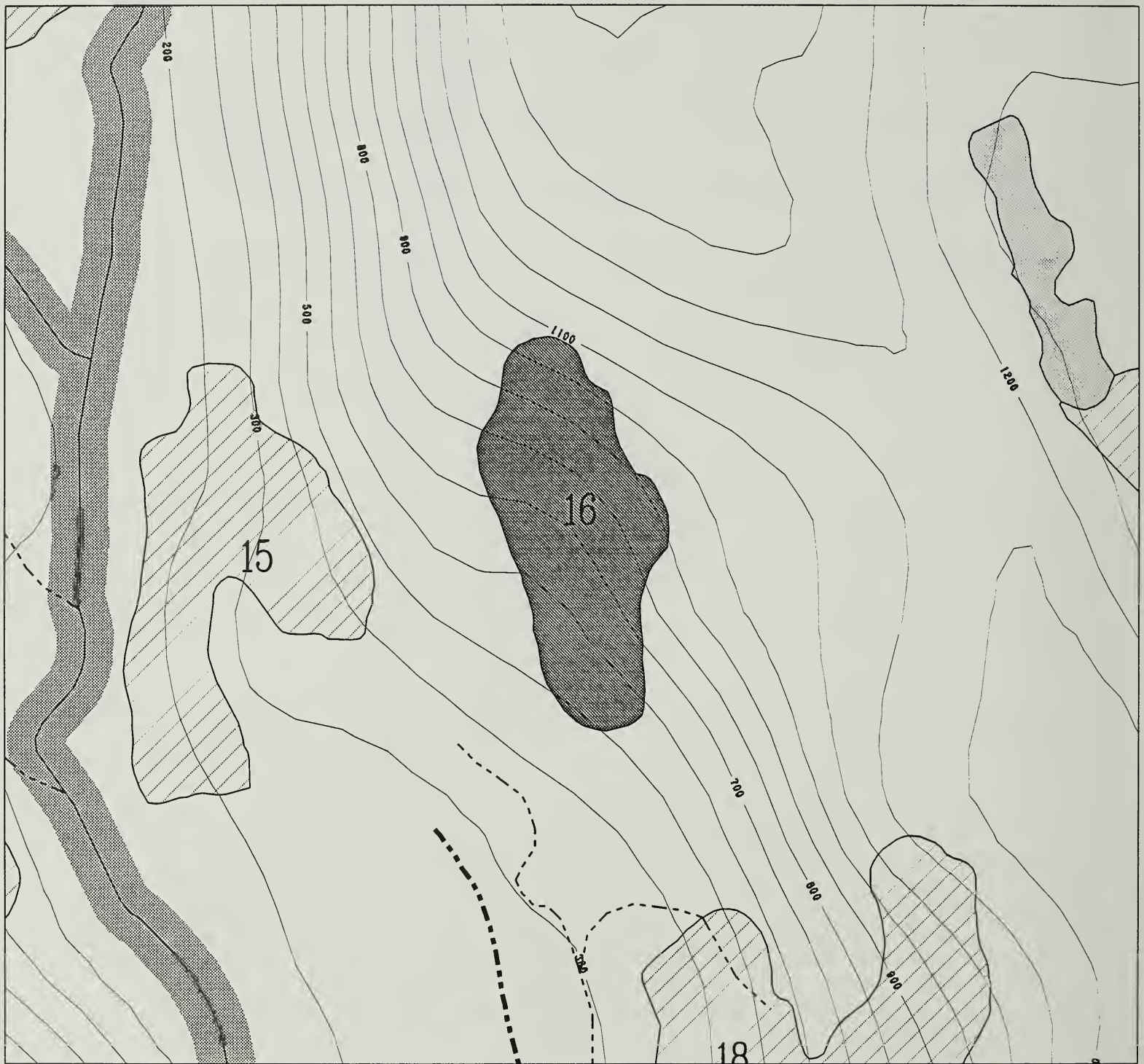
DESCRIPTION: This unit is located in the upland interior zone. Unit is located about 250 feet east of Frank Creek, a class I stream.







DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of forest blocks and maintain wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. From Frank Creek visitors will see a more modified landscape. Provide nesting habitat, brown bear bedding areas and channel/soil stability. No decline in slope stability. No measurable decline in water quality in terms of fish habitat. Similar or improved access for humans. Texture change and form shape will be visible but will not dominate the view.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years. Retain some large trees for genetic, visual and structural diversity. Channel complexity of Frank Creek maintained.

PRESCRIPTION: Unit will be managed predominately as an even-aged stand with an extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Harvest trees smaller than 12 inches in diameter only for safety. Leave scattered larger trees along the west boundary for wildlife and structural diversity. Leave culls where possible in unit. Locate boundary at least 100 feet from Frank Creek floodplain boundary (BMP 12.6). Helicopter yarding will provide full suspension of logs during yarding (BMP 13.6 E4: 13.9). Leave smaller, unmerchantable and windfirm trees in unit to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16, E1). Buffer stability may be enhanced by the residual stand in the unit because of the overstory removal silvicultural prescription (BMP 12.6a). Provide protection for geese. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of wildlife, soil and water protection.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 20 Treatment Acres 20 Harvest Acres 2012" OSR Harvest Volume 500 Harvest volume class VC5 20

Plant association is 44% western hemlock/blueberry/spinulose shield fern and 56% western hemlock/blueberry. Site productivity is from moderate to high.

DESCRIPTION: This unit is located in the upland interior zone.







DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of forested blocks and maintain wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. Unit will appear natural from the Bradfield canal. From Franks Creek visitors will see a more modified landscape. No decline in slope stability. No measurable decline in water quality. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Harvest trees smaller than 12 inches in diameter only for safety. Vary back line to make east boundary not appear straight from saltwater. All alternatives fully suspend logs by helicopter yarding the entire unit (BMPs 13.6 E4; 13.9). Leave smaller, unmerchantable and windfirm trees where possible to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16, E1; 13.1). Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected for not meeting objectives of wildlife, soil and water protection and visual appearance.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 41 Treatment Acres 41 Harvest Acres 41
12" OSR Harvest Volume 1,148 Harvest volume class VC5 41

Plant association is 36% western hemlock/blueberry/spinulose shield fern and 64% western hemlock/blueberry. Site productivity is moderate to high.

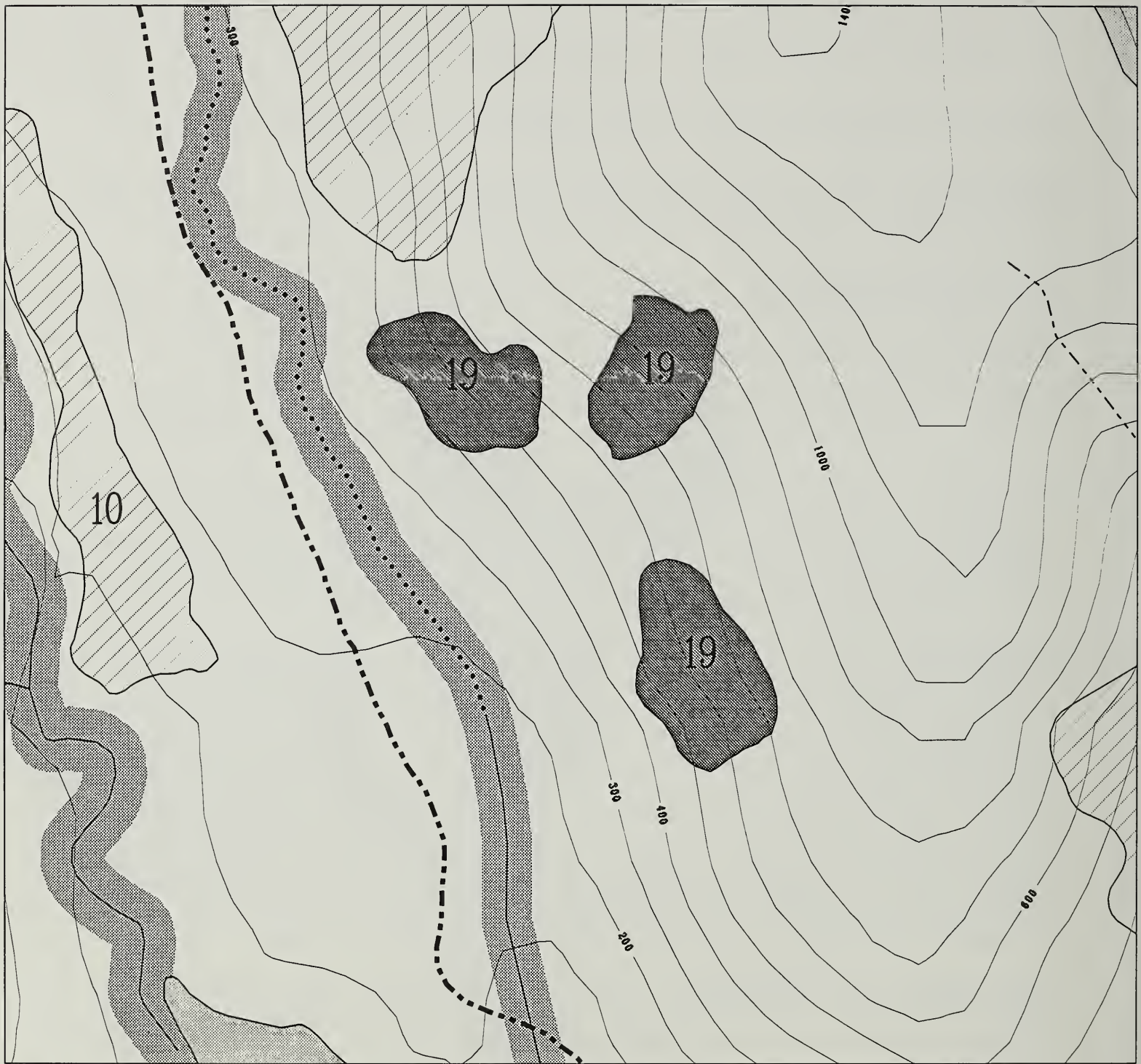
DESCRIPTION: This unit is located in the upland interior zone. There is a small stream in the northwestern tip of the unit and no water quality concerns are anticipated. There is a class II stream about 250 west of the unit.







DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of forested blocks and maintain wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. Unit will appear natural from the Bradfield canal. From Franks Creek visitors will see a more modified landscape. No decline in slope stability. No measurable decline in water quality. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Harvest trees smaller than 12 inches in diameter only for safety. Locate unit boundary at least 100 feet away from the class II stream west of unit (BMP 12.6). Vary back line to make east boundary not appear straight from saltwater. Fully suspend logs by helicopter yarding th unit (BMPs 13.6 E4; 13.9). Leave smaller, unmerchantable and windfirm trees along streambanks to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16 E1). Buffer stability may be enhanced by the residual stand in the unit because of the overstory removal silvicultural prescription (BMP 12.6a). Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of wildlife, soil and water protection and visual appearance.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE UNIT 19-1-2-3 IN ALTERNATIVES B, E, F, G, P 12" PC
 UNIT 19-1-2-3 IN ALTERNATIVES D 16" PC

12" PC Total Acres	<u>111</u>	Treatment Acres	<u>111</u>	Harvest Acres	<u>22</u>
16" PC Total Acres	<u>111</u>	Treatment Acres	<u>111</u>	Harvest Acres	<u>22</u>
12" OSR Harvest Volume	<u>501</u>	Harvest volume class	<u>VC5 22</u>		
16" OSR Harvest Volume	<u>479</u>	Harvest volume class	<u>VC5 22</u>		

Plant association is 97% western hemlock/blueberry/spinulose shield fern and 3% western hemlock/blueberry/skunk cabbage. Site productivity is high.

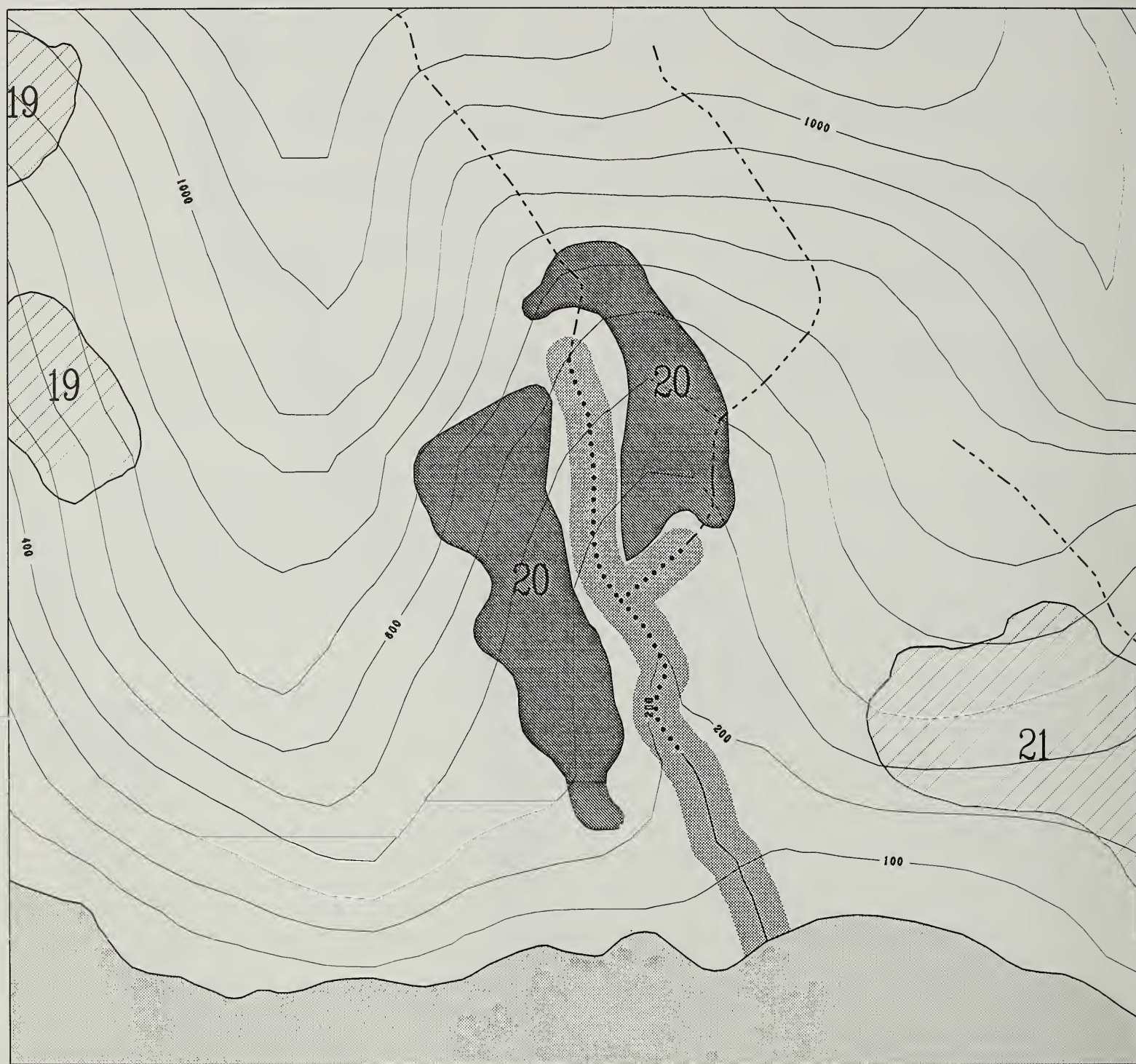
DESCRIPTION: In the draft this area was described as 111 with 3 patches. This unit is located in the saltwater facing zone. Unit is at least 250 feet east of a Class II stream. No other streams in the unit.






DESIRED FUTURE CONDITION: Short term - Unit will appear to have a texture change. Healthy vigorous grows stand of predominately western hemlock is expected. Straight lines and large openings will not be visible from salt water.






Long term - Stand will have numerous cull trees available for future snags. Increased productivity for sawlogs and higher value products is expected. Group selection will provide for 40% of unit to be harvest in three patches ranging in size from 6-9 acres. Unit will have a mix of tree sizes and vertical structure and will provide for snow interception in winter range sooner than harvest to 9 inches. Tops and limbs should return to pre-logging conditions 20-30 years.

PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Patch cut will harvest 40% of the stand for harvest in patches from 6-9 acres in size to establish regeneration. Within the patches cut trees smaller than 12 inches in diameter only for safety. Patches will be located on the benches and will stay off the unsuitable land. Leave as many cull trees standing as possible. All patch boundaries will be located at least 100 feet from the stream and will avoid the sand/silt slopes for harvest (BMP 12.6). Provide a stand with trees in several age classes with a multi-storied canopy. Fully suspend logs by helicopter yarding within the unit (BMPs 13.9; 13.1; 13.2). Leave smaller, unmerchantable and windfirm trees where possible to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16, E1; 13.1). Buffer stability may be enhanced by the residual stand in the unit because of the overstory removal silvicultural prescription (BMP 12.6a). Possible future treatments include planting, shrub control, precommercial thinning, porcupine control and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE	UNIT 20-1-2	IN ALT.	B, F, G, P	12"	OSR
	UNIT <u>20-1-2</u>	IN ALT.	D, E	16"	OSR

Total Acres	<u>30</u>	Treatment Acres	<u>30</u>	Harvest Acres	<u>30</u>
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12" OSR Harvest Volume	<u>660</u>	Treatment	Volume Class	VC4 3	VC5 27
16" OSR Harvest Volume	<u>630</u>	Treatment	Volume Class	VC4 3	VC5 27

Plant association 83 % western hemlock/blueberry/spinulose shield fern and 17 percent western hemlock/blueberry. Site productivity is high.

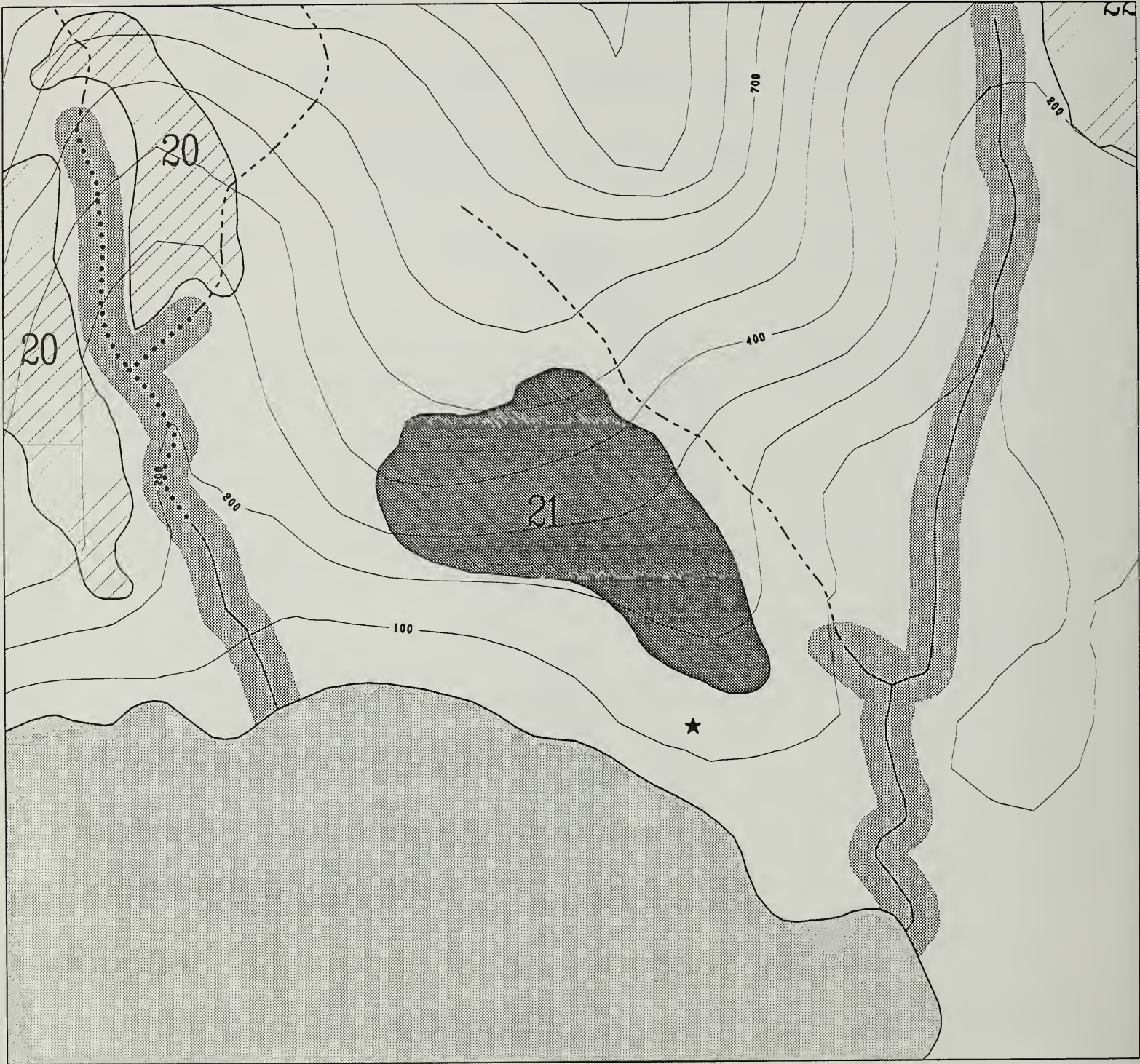
DESCRIPTION: This unit is located in the saltwater facing zone. A class III stream is in the east portion of the eastern unit. A class II stream flows between the unit 20-1 and unit 20-2.

DESIRED FUTURE CONDITION: Short term - For 15-25 years units will appear natural with a texture change from the Bradfield Canal. Straight lines and large openings will not be visible from saltwater. Healthy vigorous growing new stand will be mostly western hemlock. No decrease in water quality.

Long term - Western hemlock will be most abundant species with some Sitka spruce and a few scattered Alaska yellow cedar in a multi-storied stand over time. Stand will have trees in several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9 inch tree size. Slash from tops and limbs should return to pre-logging conditions in 20-30 years. Buffers can provide future source of wood debris for stream.

PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Harvest the overstory to establish a new stand. Provide an irregularly shaped unit. Depending upon the alternative trees less than 16 or 12 inches in diameter will be felled only for safety. Fully suspend logs by helicopter yarding near stream channels (BMPs 13.6 E4; 13.9). Leave smaller, unmerchantable and windfirm trees where possible to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16 E1). No harvest of timber within 500 feet of the beach, or 100 feet of the class II stream (BMP 12.6). Buffer stability may be enhanced by the residual stand in the unit because of the overstory removal silvicultural prescription (BMP 12.6a). Natural regeneration, predominantly hemlock is expected. Provide protection for geese. Possible future treatments include planting, shrub control, precommercial thinning, porcupine control and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This was rejected for not meeting visual objectives.



- Proposed Unit
- Proposed Adjacent Units
- Saltwater and Lakes
- TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
- ▤ Proposed Log Transfer Facility

- ~ Class 1 Streams
- ... Class 2 Streams
- - - Class 3 Streams
- ~ Contours
- - - Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 28 Treatment Acres 28 Harvest Acres 2816" OSR Harvest Volume 644 Harvest volume class VC4 14 VC5 14

Plant association is 47% western hemlock/cliffs and 53% western hemlock-Alaska cedar/blueberry. Site productivity on half the unit is low and half the unit is moderate.

DESCRIPTION: This unit is located in the saltwater facing zone. There is an eagle tree about 500 feet south of the unit.

DESIRED FUTURE CONDITION: Short term - Visitors to the Bradfield Canal will notice harvest units and the unit will appear natural. Texture change from the surrounding areas will be visible. Straight lines and large openings will not be visible from saltwater. Unit will regenerate naturally with a predominance of hemlock.

Long term - Increase productivity for sawlogs and higher value products. Species mix of western hemlock, Alaska yellow cedar and Sitka spruce with a multi-storied stand structure is desired over time. Unit is expected to regenerate naturally, predominantly with hemlock. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Tops and limbs should return to conditions similar to pre-logging in 20-30 years.

PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Unit will appear irregularly shaped. Trees less than 16 inches in diameter will be felled only for safety. Throughout the rest of the unit leave as many standing culls as safely possible. Protect the eagle tree. Fully suspend logs by helicopter yarding in unit (BMPs 13.9; 13.2; 13.1). Leave smaller, unmerchantable and windfirm trees in unit to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16, E1). Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals.



- Proposed Unit
- Proposed Adjacent Units
- Saltwater and Lakes
- TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
- ▤ Proposed Log Transfer Facility

- ~ Class 1 Streams
- ... Class 2 Streams
- ~ Class 3 Streams
- ~ Contours
- Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 22

IN ALTERNATIVES D, E,

16" OSR

Total Acres 37

Treatment Acres 37

Harvest Acres 37

16" OSR Harvest Volume

851

Harvest volume class VC5 33 VC6 4

Plant association is 19% western hemlock/blueberry/spinulose shield fern and 81% western hemlock-Alaska cedar/blueberry. Site productivity is moderate to high.

DESCRIPTION: This unit is located in the fresh water influence zone. Unit is located in a sub-watershed within Tom Creek drainage. Unit is visible from a corridor in the Harding River drainage. There is a class I stream on both the east and west side of the unit.







DESIRED FUTURE CONDITION: Short term - Embeddedness of spawning habitat not increased by management activities. Provide Vancouver Canada goose nesting and brood rearing habitat, brown bear bedding areas, channel/soil stability and travel zone for bears and other wildlife. No decline in slope stability. Stable stream banks and a future supply of large woody debris. The stream bed will contain pools with resident and anadromous fish. No measurable decline in natural variability of water quality standards. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Harvest trees smaller than 16" only for safety. Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Leave smaller, unmerchantable and windfirm trees in unit to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16 E1). No harvest of timber within 100 feet of the class I stream floodplain boundary of Tom Creek (BMP 12.6). Provide protection for eagle tree if logs yarded direct to salt water (Alt. D). Leave standing cull trees where possible for safety. Leave larger poor quality and some good quality trees in clumps for wildlife and to breakup the appearance of the unit. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of wildlife, soil and water protection and visual appearance.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 22Treatment Acres 22Harvest Acres 2212" OSR Harvest Volume 462Harvest volume class VC5 22

Plant association is 44% western hemlock/blueberry/spinulose shield fern and 56% western hemlock/blueberry. Site productivity is moderate to high.

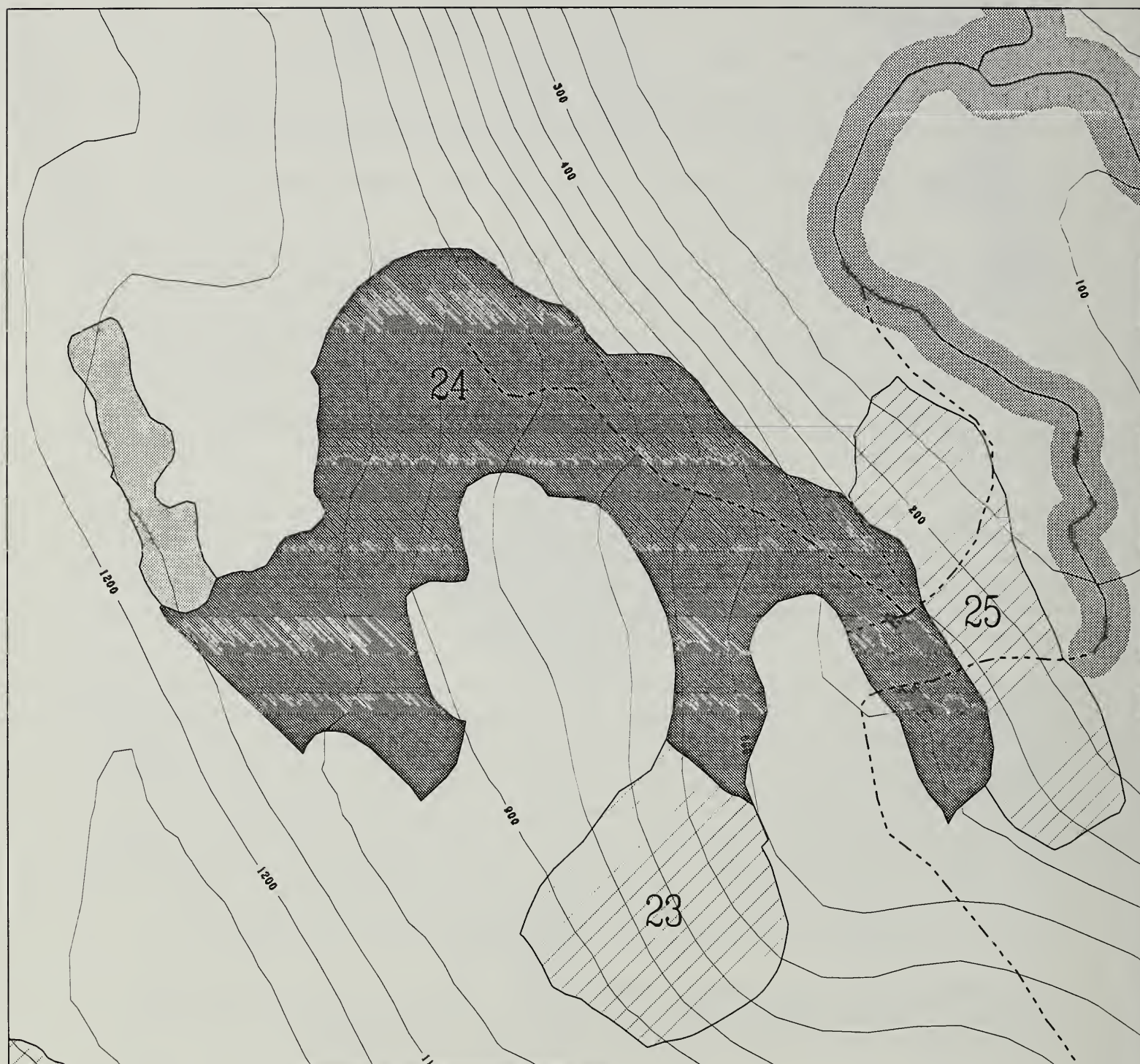
DESCRIPTION: This unit is located in the interior uplands zone. Unit is adjacent to unit 24.






DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of forest blocks and maintain wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. Provide for wildlife movement from top to bottom of unit. Unit will appear natural from the Bradfield canal. From Tom Creek visitors will see a more modified landscape. Provide nesting habitat, brown bear bedding areas and channel/soil stability. No decline in slope stability. No measurable decline in water quality standards. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Harvest trees smaller than 12 inches in diameter only for safety. Vary shape to make west boundary not appear straight from road in Tom Creek drainage. Retain as many cull trees standing as possible and leave several clumps of trees standing scattered throughout the unit for visual and structural diversity for wildlife. Fully suspend logs by helicopter yarding. Leave smaller, unmerchantable and windfirm trees along streambanks to maintain soil stability and rooting strength by application of overstory removal prescription (BMP 13.16 El). Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of wildlife, soil and water protection and visual appearance and economics.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 82Treatment Acres 82Harvest Acres 4012" PC Harvest Volume 1,000Harvest volume class VC5 40

Plant association is 76% western hemlock/blueberry/spinulose shield fern and 24% western hemlock/blueberry. Site productivity is moderate to high.

DESCRIPTION: This unit is located in the inland upland zone. One class III stream flows east through the southeastern portion of the unit. Another class III stream flows southeast through the central portion of the unit, connecting with a shorter class III stream just before exiting the unit eastward. Stand borders on units 23 and 25. Terrian is steep and frequently dissected.






DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of forest blocks and maintain wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. From Tom Creek visitors will see a more modified landscape. Provide Vancouver Canada goose nesting and brood habitat, brown bear bedding areas and channel/soil stability. No decline in slope stability. No measurable decline in water quality standards. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.






Long Term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Stand will have several different canopy layers with several age classes. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Stand will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Harvest trees smaller than 12 inches in diameter only for safety. Patches harvested will be 5-8 acres in size and total about 40 acres. Vary shape to make boundaries not appear straight from road in Tom Creek drainage. Locate patches on benches and flatter places within stand. Ensure patches within this unit are located away from stream channel where practical (BMPs 13.2; 13.3). Patches that are located primarily on the leeward (N, W) side of prevailing winds (S, E) but that "lap over" ridge tops may minimize windthrow in the residual stand (BMP 12.6a). Suspend logs when yarding across/near stream channel (BMP 13.16 E4) by helicopter yarding (BMPs 13.9; 13.1; 13.2). Retain as many cull trees standing as possible for structural diversity for wildlife. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of wildlife, soil and water protection and visual appearance.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 23Treatment Acres 23Harvest Acres 2312" OSR Harvest Volume 460Harvest volume class VC4 10 VC5 13

Plant association is 57% western hemlock-Alaska cedar/blueberry and 43% Mixed-conifer. Site productivity is moderate to high.

DESCRIPTION: This unit is located in the inlands uplands zone. Two class III streams flow through the unit. The northern of the two channels is located on an alluvial fan as it leaves the unit and has raw undercut banks.

DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of forest blocks and maintain wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. Provide for wildlife movement from top to bottom of unit. Unit will appear natural from the Bradfield canal. From Tom Creek visitors will see a more modified landscape. Provide nesting habitat, brown bear bedding areas and channel/soil stability. No decline in slope stability. No measurable decline in water quality. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.

Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Harvest trees smaller than 12 inches in diameter only for safety. Vary shape to make west boundary not appear straight from road in Tom Creek drainage. Locate unit boundary on the west bank of the alluvial fan channel (raw, undercut banks) which is located where the northern channel turns from a northeasterly to northerly direction, and which flows into a class I tributary to Tom Creek (BMPs 13.2; 13.3). Maintain the minimum 100' TTRA buffer between the unit boundary and this tributary to the east (BMP 12.6). Along the alluvial fan channel, directionally fall trees into the unit (BMP 13.16 E3) to minimize disturbance to channel banks and existing structure. Do NOT require cleanout of introduced slash as some debris will aid in channel stability (BMP 13.16 E5). Leave smaller, unmerchantable and windfirm trees and other scrub vegetation along streambanks (especially on the fan) and incised sideslopes to maintain soil stability through rooting strength (BMP 13.16 E1). This is accomplished through the silvicultural prescription (BMP 13.1). Suspend logs when yarding near/across stream channels to minimize streambank and sideslope disturbance (BMP 13.16 E4) through helicopter yarding (BMPs 13.9; 13.1; 13.2). Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of wildlife, soil and water protection and visual appearance.



- Proposed Unit
- Proposed Adjacent Units
- Saltwater and Lakes
- TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
- Proposed Log Transfer Facility

- ~ Class 1 Streams
- ... Class 2 Streams
- - - Class 3 Streams
- ~ Contours
- - - Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 10 Treatment Acres 10 Harvest Acres 109" CC Harvest Volume 120 Harvest volume class VC4 9 VC5 1

Plant association is Mixed-conifer/blueberry/skunk cabbage. Site productivity is low.

DESCRIPTION: This unit is located in the fresh water influence zone. Unit is above Tom Creek. The boundary on the west side on the unit is above a slope break above Tom Creek. A class III stream bisects the southeastern portion of the unit.







DESIRED FUTURE CONDITION: Short term - High-quality habitat for fish and riparian-associated wildlife species. Provide for channel/soil stability and a travel zone for bears and other wildlife. No decline in slope stability. Stream banks will be stable and there will be a future supply of large woody debris. The stream bed will contain pools with resident and anadromous fish. Any roads constructed will be on stable areas with minimum sediments impacts to the water quality. No measurable decline in water quality beyond natural variability. Similar or improved access for humans and some change of the visual character of the fresh water influence zone. Texture and form change will be visible and will not dominate the view.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Unit will be managed as an even-aged stand. Establish new stand by harvesting the overstory. Harvest all trees larger than 9 inches in diameter using a cable yarding system. Leave small groups of mixed sized trees along the road to help screen unit from viewpoint located closer to saltwater on the road if possible. The WNW unit boundary is designed to remain at least 100 feet from Tom Creek and above slope break into that channel to maintain the stability of its deep sand banks (BMPs 12.6; 13.2; 13.3). Partial suspend logs across the small stream to minimize streambank disturbance (BMP 13.16 E4). Locate landing to maximize areas of partial suspension.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit in small groups. This rejected as not feasible with cable yarding. This unit is not feasible for shovel yarding because of soils and slopes.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE UNIT 27 IN ALTERNATIVES E 12" OSR/w/Ex

Total Acres 13 Treatment Acres 13 Harvest Acres 13

12" OSR/w/Ex Harvest Volume 260 Harvest volume class VC5 13

The plant association is western hemlock/blueberry/spinulose shield fern. Site productivity is high.

DESCRIPTION: This unit is located in the fresh water influence zone and is adjacent to unit 28. There is a small class III stream in the southeastern corner of the unit.







DESIRED FUTURE CONDITION: Short term - High-quality habitat for fish and riparian-associated wildlife species. Provide for channel/soil stability and a travel zone for bears and other wildlife. No decline in slope stability. Stable stream banks are expected. Any roads constructed will be on stable areas with minimum sediments impacts to the water quality. No measurable decline in water quality below range of natural variation. Similar or improved access for humans and some change of the visual character of the fresh water influence zone. Texture change and form shape will be visible but will not dominate the view.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Using a helicopter, harvest all trees larger than 12 inches in diameter to establish regeneration. Leave a strip of uncut trees between unit 26 and 27 and also between 27 and 28 for wildlife travel up and down slope. Fully suspend logs by helicopter yarding near stream channel (BMP's 13.6, E4, 13.9) to minimize streambank disturbance.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit to 9 inch size. This rejected as not economic and did not meet the visual or wildlife objectives. Unit was considered for shovel yarding and this is not feasible due to topography and slope.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 26 Treatment Acres 520 Harvest Acres 520
9" CC Harvest Volume 520 Harvest volume class VC4 14 VC5 12 ac

The plant association is 52% western hemlock, 8% western hemlock/blueberry, 36% western hemlock/blueberry/spinulose shield fern, and 4% mixed-conifer/blueberry/skunk cabbage. Site productivity is low to moderate.

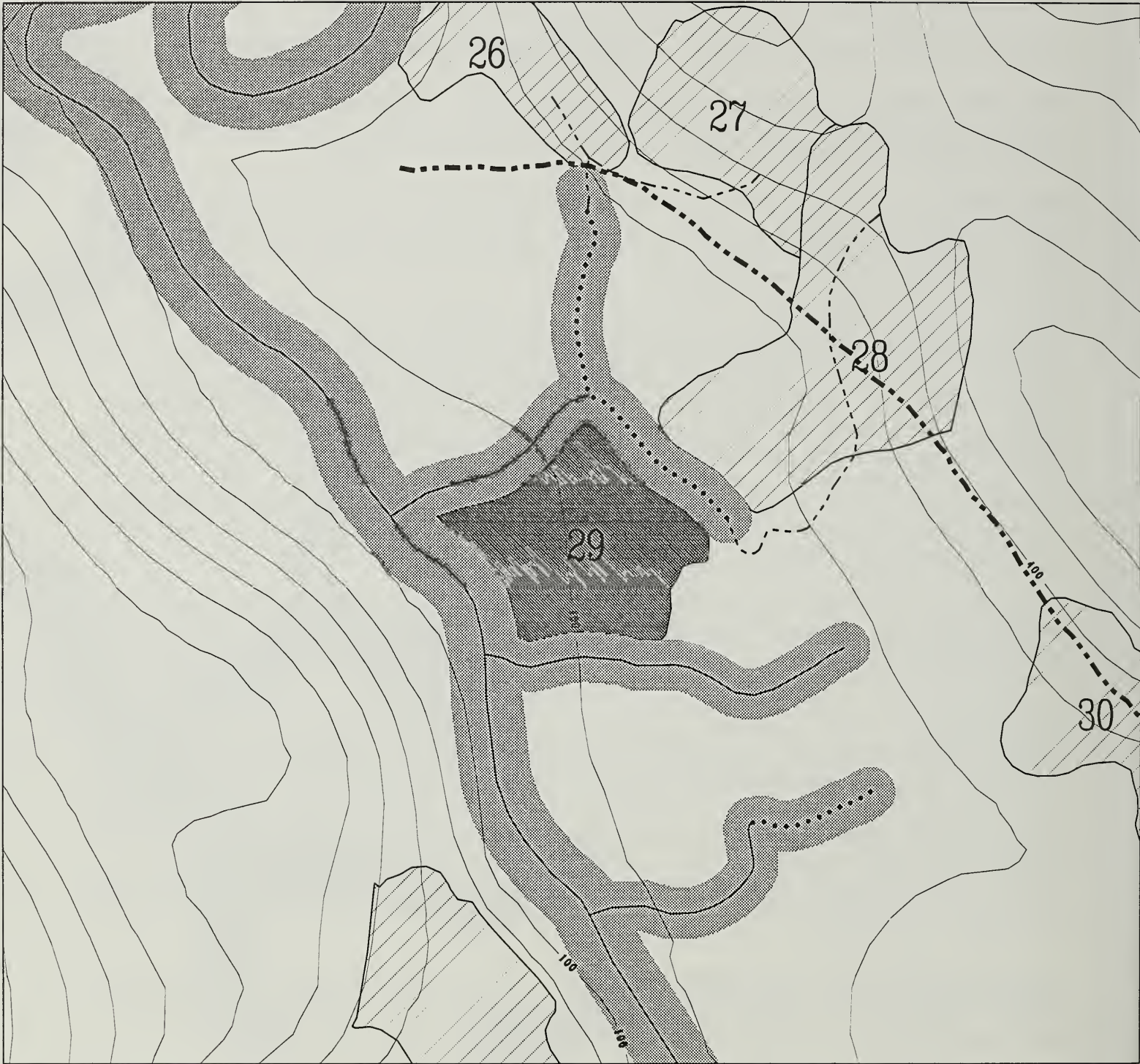
DESCRIPTION: This unit is located in the fresh water influence zone. Unit is above Tom Creek and has a class II stream that flows along the south boundary and a class III stream through the unit. Ravine side slopes are erosive and may become unstable when logged.

DESIRED FUTURE CONDITION: Short term - High-quality habitat for fish and riparian-associated wildlife species. Provide for channel/soil stability and a travel zone for bears and other wildlife. No decline in slope stability. Stream banks will be stable and there will be a future supply of large woody debris. The stream bed will contain pools with resident and anadromous fish. Any roads constructed will be on stable areas with minimum impacts to the water quality. No measurable decline in water quality beyond natural variation. Similar or improved access for humans and some change of the visual character of the fresh water influence zone. Texture and form change will be visible but will not dominate the view.

Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Unit will be managed as an even-aged stand. Establish new stand by harvesting the overstory. Harvest all trees larger than 9 inches in diameter using a cable yarding system. Leave small groups of mixed sized trees along the road to help screen unit from viewpoint located closer to saltwater. Unit is designed to use slope breaks as unit boundary, including a 100 minimum buffer above the class II habitat near the west unit boundary (BMPs 13.3; 12.6). Directionally fell trees into unit to avoid yarding up sideslopes (BMP 13.16 E3). Partial suspend across small ravine extending NE into unit (BMP 13.16 E4).

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit in small groups. This rejected as not feasible with cable yarding. This unit is not feasible for shovel yarding because of soils and slopes.



- Proposed Unit
- Proposed Adjacent Units
- Saltwater and Lakes
- TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
- ▬ Proposed Log Transfer Facility

- ~ Class 1 Streams
- ... Class 2 Streams
- ~ Class 3 Streams
- ~ Contours
- ~ Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 14 Treatment Acres 14 Harvest Acres 14
12" OSR Harvest Volume 280 Harvest volume class VC4 2 VC5 12 ac

The plant association is western hemlock. Site productivity is high.

DESCRIPTION: This unit is located in the fresh water influence zone. There is a class II stream east of the unit. This stream turns into a class III. On the north, south, and west are class I streams.

DESIRED FUTURE CONDITION: Short term - High-quality habitat for fish and riparian-associated wildlife species. Provide for channel/soil stability and a travel zone for bears and other wildlife. No decline in slope stability. Stream banks will be stable and there will be a future supply of large woody debris. The stream bed will contain pools with resident and anadromous fish. No measurable decline in range of natural water quality. Similar or improved access for humans and some change of the visual character of the fresh water influence zone. Texture and form change will be visible but will not dominate the view.

Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Unit will be managed as an even-aged stand. Establish new stand by harvesting the overstory. Harvest all trees larger than 9 inches in diameter. Unit is designed to use slope breaks as unit boundary, including a 100 minimum buffer above the class II habitat near the west unit boundary (BMPs 13.3; 12.6). Directionally fell trees into unit to avoid yarding up sideslopes (BMP 13.16 E3). Partial suspension required at all times; attempt full suspension in northeast corner of unit (BMP 13.16 E4).

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit in small groups. This rejected as not feasible with cable yarding. This unit is not feasible for shovel yarding because of soils and slopes.



- Proposed Unit
- Proposed Adjacent Units
- Saltwater and Lakes
- TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
- Proposed Log Transfer Facility

- ~ Class 1 Streams
- ... Class 2 Streams
- - - Class 3 Streams
- ~ Contours
- - - Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 12 Treatment Acres 12 Harvest Acres 12
9" CC Harvest Volume 192 Harvest volume class VC4 12 ac

The plant association is mixed-conifer/blueberry/skunk cabbage. Site productivity is low.

DESIRED FUTURE CONDITION: Short term - High-quality habitat for fish and riparian-associated wildlife species. No decline in slope stability. Any roads constructed will be on stable areas with minimum sediments impacts to the water quality. No measurable decline in water quality. Similar or improved access for humans and some change of the visual character of the fresh water influence zone. Texture change and form shape will be visible but will not dominate the view.

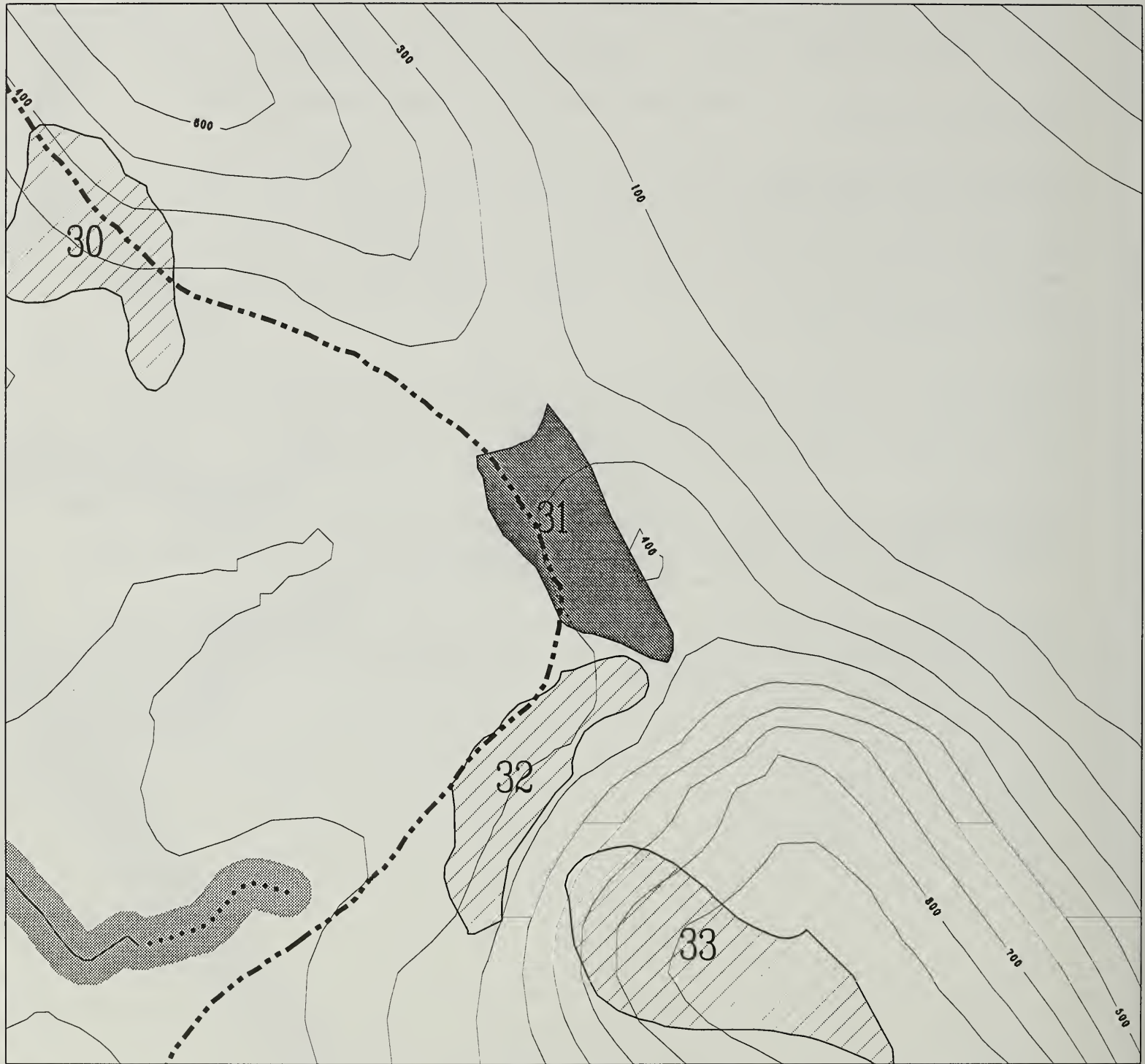
Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce or yellow cedar as only a minor component. Branches and tops should return to pre-logging conditions in 20-30 years.






PRESCRIPTION: Unit will be managed as an even-aged stand. Establish new stand by harvesting the overstory. Harvest all trees larger than 9 inches in diameter using a cable yarding system. If possible leave a mix of tree sizes in groups along the road to help unit blend into the landscape.






OTHER PRESCRIPTIONS CONSIDERED: Harvest unit in small groups. This rejected as not feasible with cable yarding. Unit was considered for shovel yarding and this is not feasible due to terrain.

UNIT 31

ALTERNATIVE E



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 31 IN ALTERNATIVES

E 9" CC

Total Acres 10

Treatment Acres 10

Harvest Acres 10

9" CC Harvest Volume 200

Harvest volume class VC5 10

The plant association is western hemlock/blueberry/spinulose shield fern. Site productivity is high.

DESCRIPTION: The unit is located in the fresh water influence zone.

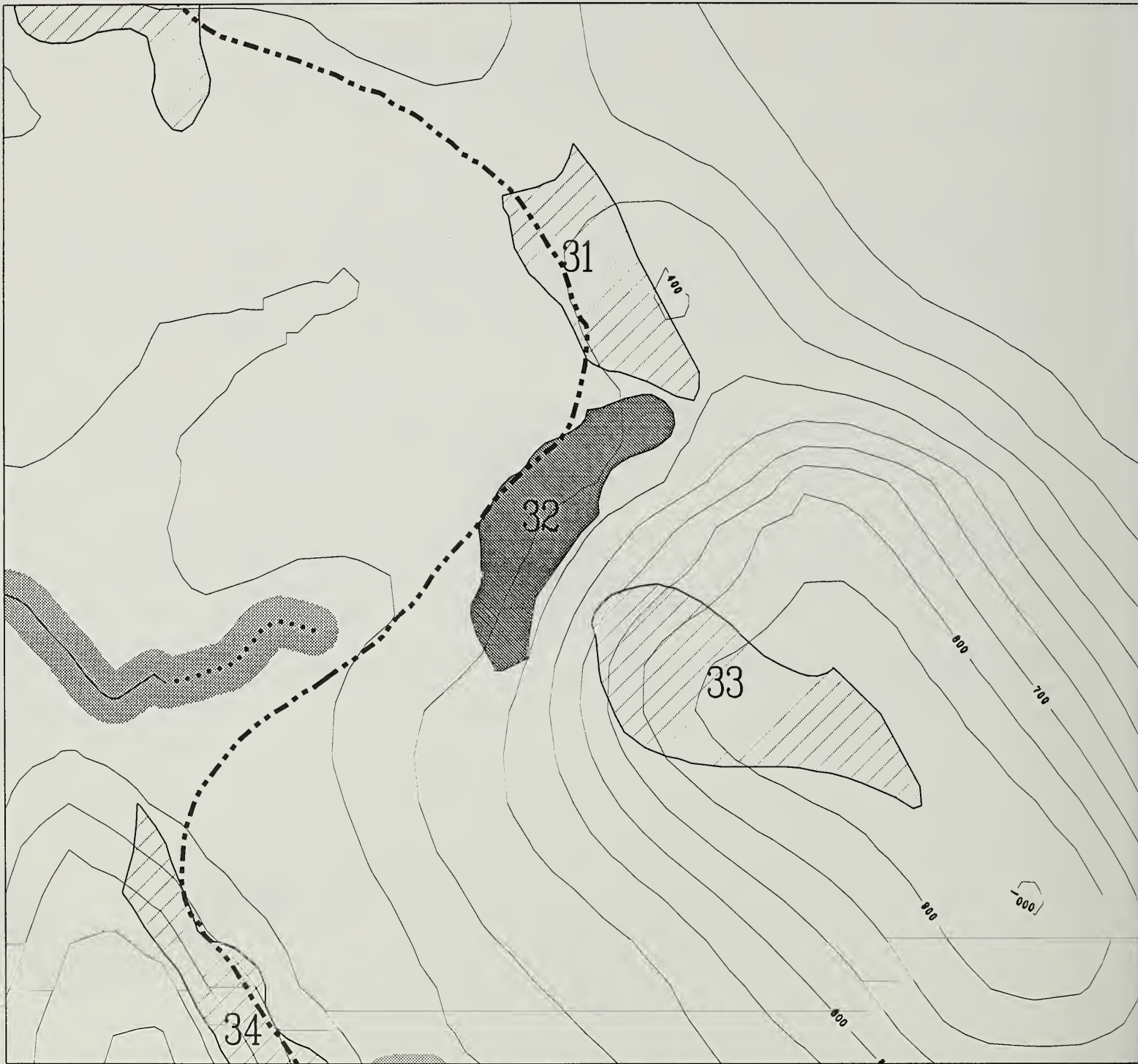
DESIRED FUTURE CONDITION: Short term - No decline in slope stability.

Any roads constructed will be on stable areas with minimum sediments impacts to the water quality. No measurable decline in water quality. Similar or improved access for humans and some change of the visual character of the fresh water influence zone. Texture change and form shape will be visible and will not dominate the view.

Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce or yellow cedar as only a minor component. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Unit will be managed as an even-aged stand Establish new stand by harvesting the overstory. Harvest all trees larger than 9 inches in diameter using a cable yarding system. If possible leave a mix of tree sizes in groups along the road to help unit blend into the landscape.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit in small groups. This rejected as not feasible with cable yarding. Unit was considered for shovel yarding and this is not feasible due to topography and slope.



- Proposed Unit
- Proposed Adjacent Units
- Saltwater and Lakes
- TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
- Proposed Log Transfer Facility

- ~ Class 1 Streams
- ... Class 2 Streams
- ~ Class 3 Streams
- ~ Contours
- ~ Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 10 Treatment Acres 10 Harvest Acres 10
9" CC Harvest Volume 160 Harvest volume class VC4 10

The plant association is western hemlock and cliffs. Site productivity is low.

DESCRIPTION: This unit is located in the interior uplands zone.







DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of forest blocks and maintain wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. Unit will appear natural from the Bradfield canal. From Frank Creek visitors will see a more modified landscape. No decline in slope stability. Any roads constructed will be on stable areas with minimum sediment impact to the water quality. No measurable decline in water quality. Similar or improved access for humans. Texture change and form shape will be visible but will not dominate the view. Unit may regenerate naturally with a predominance of hemlock.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A stand of growing trees, composed mostly of hemlock with some spruce and yellow cedar as only a minor component. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Establish new stand by harvesting the overstory. Stand will be managed as an even-aged stand. Harvest all trees larger than 9 inches in diameter using a cable yarding system. Leave a mix of tree sizes in groups along the road to help unit blend into the landscape if possible. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit in small groups. This rejected as not feasible with cable yarding. Unit was considered for shovel yarding and this is not feasible due to topography and slope.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 33

IN ALTERNATIVES

E

12" OSR

Total Acres 16

Treatment Acres 16

Harvest Acres 16

12" OSR Harvest Volume 320

Harvest volume class VC5 16

The plant association is western hemlock-Alaska cedar/blueberry. Site productivity is high.

DESCRIPTION: This unit is located in the fresh water influence zone. Unit is not accessible with a road.







DESIRED FUTURE CONDITION: Short term - Texture change and form shape will be visible but will not dominate the view. Unit is expected to regenerate naturally with an increase in hemlock. No decline in slope stability.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce and yellow cedar as only a minor component. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Harvest trees smaller than 12 inches in diameter only for safety. Feather the lower portion of this unit where it is adjacent to Unit 32. Unit should appear as a series of small openings as viewed from the Bradfield Canal. Unit will be yarded with a helicopter.

OTHER PRESCRIPTIONS CONSIDERED: Harvest to 9 inch limit would not meet visual objectives.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 9 Treatment Acres 9 Harvest Acres 9
9" CC Harvest Volume 189 Harvest volume class VC5 9

The plant association is western hemlock and cliffs.

DESCRIPTION: This unit is located in the interior uplands zone, northwest of a lake. Site productivity is moderate. There are few trees of varying small sizess around the lake and within the buffer zone shown on the unit map.







DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of forest blocks and maintain wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. Unit will appear natural from the Bradfield canal. From Frank Creek visitors will see a more modified landscape. Provide for channel/soil stability and no decline in slope stability. Any roads constructed will be on stable areas with minimum sediments impacts to the water quality. No measurable decline in water quality. Similar or improved access for humans. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A stand of growing trees, composed mostly of hemlock with some increase in spruce and yellow cedar as only a minor component. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Establish new stand by harvesting the overstory. Stand will be managed as an even-aged stand. Harvest all trees larger than 9 inches in diameter using a cable yarding system. Leave a mix of tree sizes in groups along the road to help unit blend into the landscape if possible. Unit is designed to ensure the minimum 100' TTRA buffer is maintained between the unit boundary and the lake (BMP 12.6). Instability of lake buffer is unlikely due to the proximity of large muskegs and poorer, more-open-grown timber (BMP 12.6a). Locate unit boundary at least 100 feet of the lake. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit in small groups. This rejected as not feasible with cable yarding. Unit was considered for shovel yarding and this is not feasible due to topography and slope.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 35

IN ALTERNATIVES

E 9" CC

Total Acres 13

Treatment Acres 13

Harvest Acres 13

9" CC Harvest Volume 234

Harvest volume class VC4 13

The plant association is mixed-conifer/blueberry/skunk cabbage. Site productivity is low.

DESCRIPTION: This unit is located in the fresh water influence zone. There are no fisheries concerns with this unit. Unit is located on the west side of a lake. There are few trees of varying small sizes around the lake and within the buffer zone shown on the unit map.






DESIRED FUTURE CONDITION: Short term - Provide high quality habitat for fish and riparian-associated wildlife species. Provide for soil stability and a travel zone for bears and other wildlife. Any roads constructed will be on stable areas with minimum impacts to the water quality. No measurable decline in water quality. Similar or improved access for humans. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A stand of growing trees, composed mostly of hemlock with some increase in spruce and yellow cedar as only a minor component. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Establish new stand by harvesting the overstory. Stand will be managed as an even-aged stand. Harvest all trees larger than 9 inches in diameter using a cable yarding system. Unit is designed to ensure the minimum 100' TTRA buffer is maintained between the unit boundary and the lake (BMP 12.6). Instability of lake buffer is unlikely due to the proximity of large muskegs and poorer, more-open-grown timber (BMP 12.6a). Locate boundary at least 100 feet from the lake. Leave a mix of tree sizes in groups along the road to help unit blend into the landscape if possible. If feasible, feather the unit into the trees above the backline. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit in small groups. This rejected as not feasible with cable yarding. Unit was considered for shovel yarding and this is not feasible due to topography and slope.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

CAMPBELL TIMBER SALE

UNIT 36

IN ALTERNATIVES

E

12" OSR

Total Acres 13

Treatment Acres 13

Harvest Acres 13

12" OSR Harvest Volume 130

Harvest volume class VC4 13

The plant association is western hemlock/blueberry. Site productivity is moderate.

DESCRIPTION: This unit is located in the interior uplands zone. Unit is not accessible with a road and the south boundary is the lake.

DESIRED FUTURE CONDITION: Short term - Reduce fragmentation of wildlife travel corridors to adjacent drainages. Harvest units should mimic natural vegetative patterns. Unit will appear natural from the Bradfield Canal. From Frank Creek visitors will see a more modified landscape. Provide for soil stability and a travel zone for bears and other wildlife. No decline in slope stability. No measurable decline in water quality. Similar or improved access for humans. Texture change and shape will be visible and will not dominate the view. Unit is expected to regenerate predominately with hemlock.

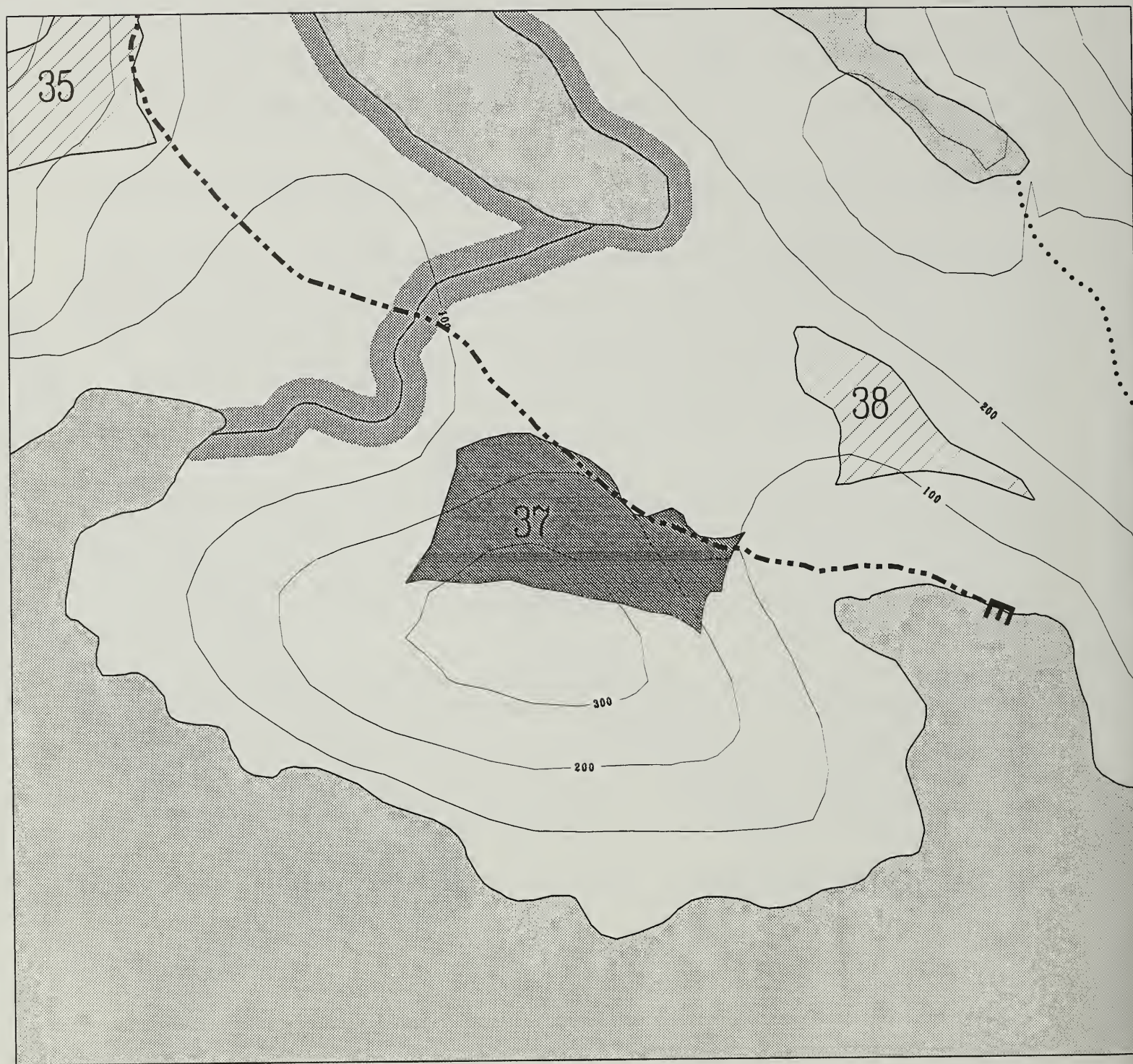
Long term - Increase in productivity for sawlogs and higher value products can be expected. A healthy vigorous growing stand of trees, composed mostly of hemlock with some spruce and yellow cedar as only a minor component. Unit will have several different canopy layers with several age classes. Unit will provide wildlife with snow interception in winter range sooner than harvest to a 9" tree size. Branches and tops should return to pre-logging conditions in 20-30 years.






PRESCRIPTION: Unit will be managed as predominately an even-aged stand with an extended rotation of 120-150 years. Establish new stand by harvesting the overstory. Harvest trees smaller than 12 inches in diameter only for safety. Unit should appear as a series of small openings as viewed from the Bradfield Canal. Directionally fall trees away from the lake and into the unit (BMP 13.16 E3). Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.






OTHER PRESCRIPTIONS CONSIDERED: Harvest to 9 inch limit would not meet visual objectives.

UNIT 37

ALTERNATIVE E



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
- ★ Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 16 Treatment Acres 16 Harvest Acres 169" CC Harvest Volume 256 Harvest volume class VC4 16

The plant association is 13% mixed-conifer and 87% western hemlock cliffs. Site productivity is low to moderate.

DESCRIPTION: This unit is located in the fresh water influence zone.







DESIRED FUTURE CONDITION: Short term - Provide for soil stability and a travel zone for bears and other wildlife. No decline in slope stability. Any roads constructed will be on stable areas with minimum sediments impacts to the water quality. No measurable decline in water quality. Similar or improved access for humans and some change of the visual character of the fresh water influence zone. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A stand of growing trees, composed mostly of hemlock with some increase in spruce and yellow cedar as only a minor component. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Establish new stand by harvesting the overstory. Stand will be managed as an even-aged stand. Harvest all trees larger than 9 inches in diameter using a cable yarding system. Leave a mix of tree sizes in groups along the road to help unit blend into the landscape if possible. If feasible, feather the backline into the remaining trees. Do not harvest trees within the 500 foot beach buffer or within the 1,000 estuary buffer. A small rill (discontinuous, 3 feet wide) flows from the east half of the unit into saltwater. Partially suspend logs across rill to minimize streambed disturbance and sediment production (BMP 13.16 E4). Locate landing to minimize yarding along the length of the rill (BMP 13.10 E2,3,4). Locate road to access unit outside of the beach and estuary buffers if possible. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit in small groups. This rejected as not feasible with cable yarding. Unit was considered for shovel yarding and this is not feasible due to topography and slope.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

Total Acres 7 Treatment Acres 7 Harvest Acres 79" CC Harvest Volume 112 Harvest volume class VC4 7

The plant association is mixed-conifer series. Site productivity is moderate.

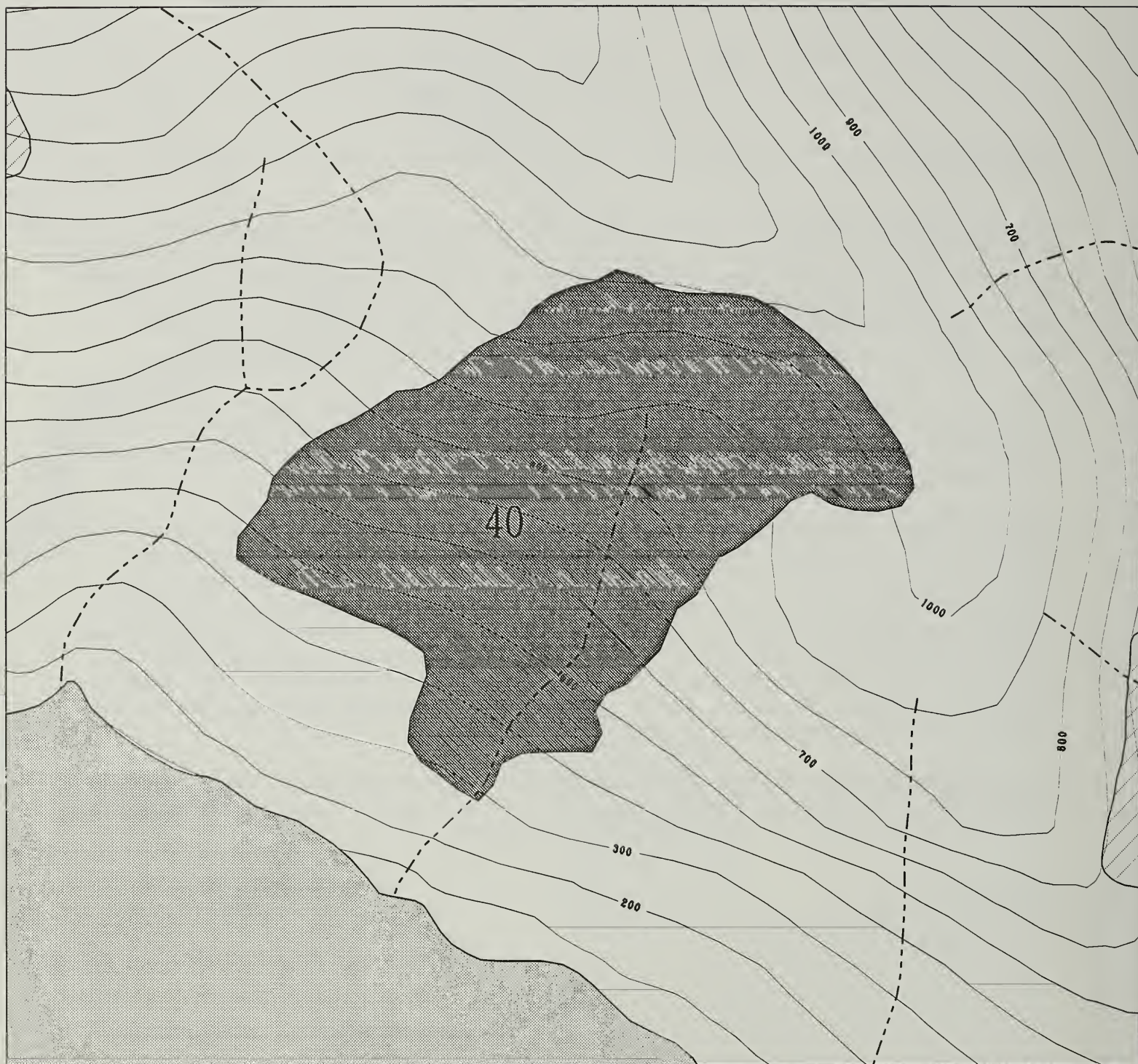
DESCRIPTION: This unit is located in the fresh water influence zone. Unit is not accessible with a road.







DESIRED FUTURE CONDITION: Short term - Provide high quality habitat for wildlife species. Provide for soil stability and a travel zone for bears and other wildlife. No decline in slope stability. No measurable decline in water quality. Some change of the visual character of the fresh water influence zone. Texture change and form shape will be visible but will not dominate the view. Unit will regenerate naturally with a predominance of hemlock.






Long term - Increase in productivity for sawlogs and higher value products can be expected. A stand of growing trees, composed mostly of hemlock with some increase in spruce and yellow cedar as only a minor component. Branches and tops should return to pre-logging conditions in 20-30 years.

PRESCRIPTION: Establish new stand by harvesting the overstory. Stand will be managed as an even-aged stand. Harvest all trees larger than 9 inches in diameter using a cable yarding system. Leave a mix of tree sizes in groups along the road to help unit blend into the landscape if possible. If feasible, feather the backline into the remaining trees. Do not harvest trees within the 500 foot beach buffer or within the 1,000 estuary buffer. Locate road to access unit outside of the beach and estuary buffer if possible. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit in small groups. This rejected as not feasible with cable yarding. Unit was considered for shovel yarding and this is not feasible due to topography and slope.



-  Proposed Unit
-  Proposed Adjacent Units
-  Saltwater and Lakes
-  TTRA Stream and Lake Buffers
-  Eagle Nest Tree
-  Proposed Log Transfer Facility

-  Class 1 Streams
-  Class 2 Streams
-  Class 3 Streams
-  Contours
-  Proposed Roads

Scale: 1 inch = 660 feet

GS Total Acres 82 Treatment Acres 82 Harvest Acres 20
9" GS Harvest Volume 240 Harvest volume class VC4 14 VC5 6 ac

Plant association is 62% western hemlock-Alaska cedar/blueberry and 48% mixed-conifer series. Site productivity is moderate.

DESCRIPTION: This unit is located in the saltwater facing zone adjacent to the beach fringe.

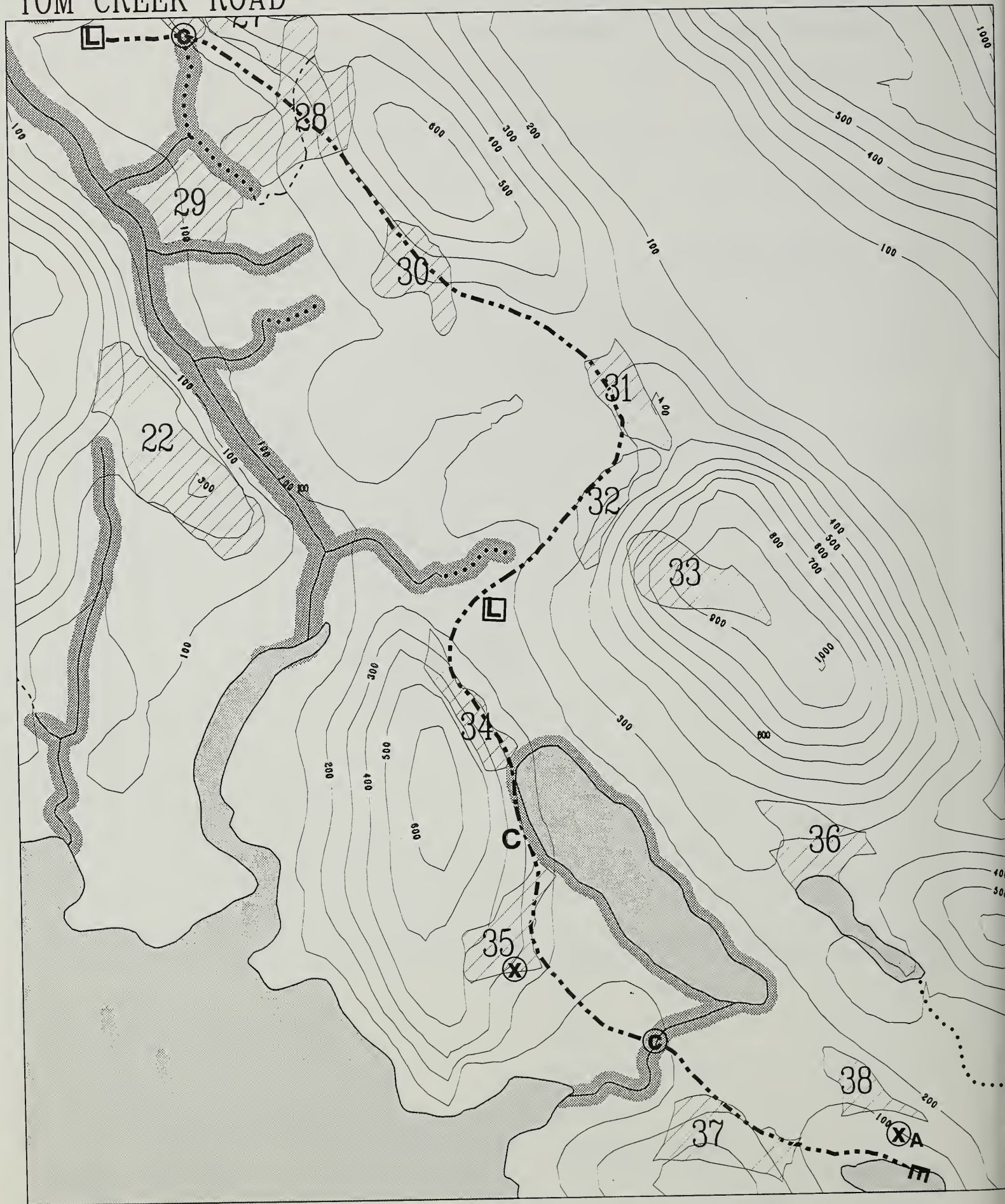
DESIRED FUTURE CONDITION: Short term - Maintain migration corridors up and down slope between goat winter range and summer range. Visitors to the Bradfield Canal will notice harvest units that will meet the visual quality objective of partial retention. The units will appear to have a texture change from the surrounding areas, but the change will appear natural. Straight lines and large openings will not be visible from saltwater. Unit will regenerate naturally with a predominance of hemlock.

Long term - Increased productivity for sawlogs and higher value products is expected. Tops and branches are expected to return to pre-logging conditions on 20-30 years.

PRESCRIPTION: Establish new stand by harvesting the overstory and manage as predominately as an even-aged multi-storied patchy stand with trees in several age classes with an extended rotation of 120-150 years. Provide an irregularly shaped unit boundary. Harvest the stand with small groups that average 2 acres in size. and harvest no more than 25% (20 acres) of the stand. Uncut areas will provide for migration between beach fringe and upslope areas. Vary edges and backline to blend with the landscape. Ensure selected groups within this unit are located away from stream channel where practical (BMPs 13.2; 13.3). Terrain should be assessed during layout to determine if sites for groups which might be more windfirm exist. These may include: sites located primarily on the leeward (N, W) side of prevailing winds (S, E), but which "lap over" ridge tops; and long, narrow groups with their length contouring the slope and parallel to prevailing winds (BMP 12.6a). Partially suspend logs when yarding across/near stream channel (BMP 13.16 E4). This is accomplished through helicopter yarding (BMPs 13.9; 13.1; 13.2). No harvest of timber within 500 foot of the beach. Leave as many cull trees standing as safety permits. Possible treatments include planting, shrub control, precommercial thinning, porcupine control, and a sanitation cut.

OTHER PRESCRIPTIONS CONSIDERED: Harvest unit taking all trees larger than 9 inches in diameter. This is rejected as not meeting objectives of visuals.

TOM CREEK ROAD



(X) ROCK PIT

(C) 60" CMP OR LARGER

--- ROAD LOCATION

M RAMP

L LANDING

PLANNED ROAD CARD

PROJECT NAME: Campbell, Tom Creek Road MGT AREA: S31 VCU: 510

ROAD NUMBER: _____ FUNCTIONAL CLASS: _____ ENTRY CYCLE: _____

LENGTH: 3.3 miles TRAFFIC SERVICE LEVEL: _____ DESIGN SPEED: 10DESIGN VEHICLE: Log Truck CRITICAL VEHICLE: Log Truck HIGHWAY SAFETY ACT: _____MAINTENANCE LEVELS: (ACTIVE SALE) _____ POST SALE: Closed, Put to BedINTENDED PURPOSE: To provide access for timber management activities and forest service administration.TRAFFIC MANAGEMENT STRATEGY: Close the roads by trenching and or placing mineral and organic debris on road bed in certain areas (BMP 14.24).EROSION CONTROL: All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMP 14.5 E1). Areas a to b may need to be endhauled (BMP 14.12).ROAD LOCATION: Point A would have a rock ramp for water access. Typical construction except at point C which has approx. 50 ft. of fullbench rock cut on the edge of the lake (BMP 14.7 E2; 14.12). See considerations below.ROCK PITS: Pit A may have visual concerns. Pit A will be designed if possible with a buffer to blend into the surrounding vegetation. To reduce mass movement potential during periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended thus reducing vibration that may induce mass movement (BMP 14.18; 14.7 E3,4).STREAM CROSSINGS: Due to fisheries potential, oversize and install CMP on lake outlet at a low gradient. There are 4 stream crossings which will require a 36" cmp or larger (BMP 14.9; 14.17).FUTURE NEEDS: None. Close road to all motorized traffic, including ATVs.VEGETATIVE MGT: Use minimum clearing widths. Minimum width will be 10 feet beyond the catch point of the road.TIMING RESTRICTIONS: On all fish streams there shall be a timing window for any road construction (BMP 14.6 E4; 12.6; 13.3).MONITORING NEEDS: Monitor effectiveness of road closures.CONSIDERATIONS: HIGH HAZARD SOILS: GIS identifies three segments of the road that traverse high hazard areas. The first is located near the lake. Road will be built on a 50 foot bench with 10% sideslopes immediately adjacent to lake. 50 feet of this construction will need to be full bench. Construct and maintain this segment with an insloping surface and ditch to filter areas before water enters relief culverts (BMP 14.3 E2; 14.20). Second area lies adjacent to high hazard. Road will be located in muskeg. Third area is on 50% sideslopes. Construct full bench with endhaul construction (BMP 14.12).

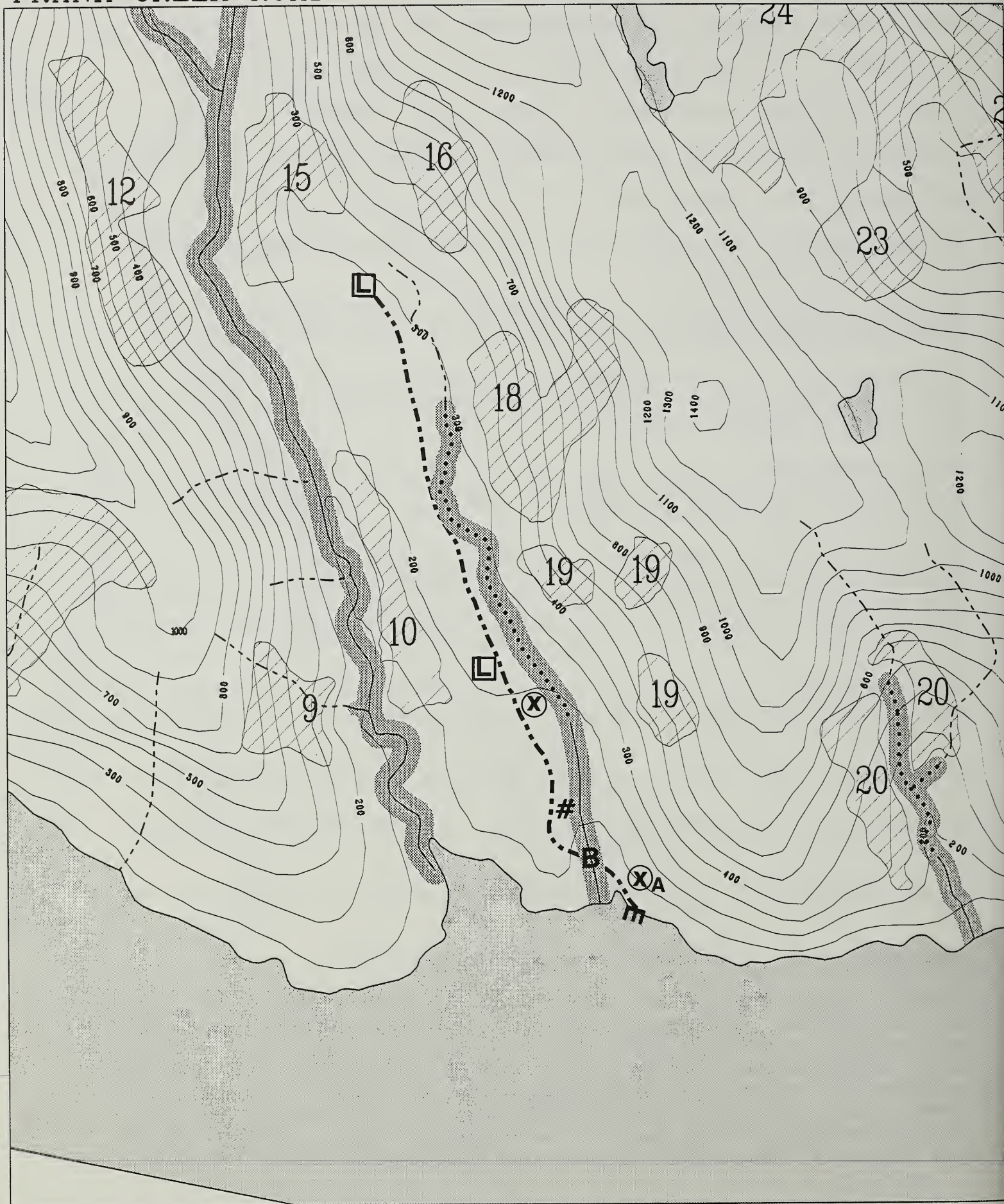
I.D.

TEAM: _____

Recommended

By: _____ Date: _____

FRANK CREEK ROAD



(X) ROCK PIT

[] LANDING

(C) 60" CMP OR LARGER

[M] RAMP

BULKWORK

--- ROAD LOCATION

PLANNED ROAD CARD

PROJECT NAME: Campbell, Frank Creek Road MGT AREA: S31 VCU: 510ROAD NUMBER: 54100 FUNCTIONAL CLASS: _____ ENTRY CYCLE: _____LENGTH: 1.3 miles TRAFFIC SERVICE LEVEL: _____ DESIGN SPEED: 10DESIGN VEHICLE: Log Truck CRITICAL VEHICLE: Log Truck HIGHWAY SAFETY ACT: _____MAINTENANCE LEVELS: (ACTIVE SALE) _____ POST SALE: Closed, Put to BedINTENDED PURPOSE: To provide access for timber management activities and forest service administration.TRAFFIC MANAGEMENT STRATEGY: Close the roads by trenching and or placing mineral and organic debris on road bed in certain areas (BMP 14.24).EROSION CONTROL: All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMP 14.8 E1). At point B the road is on 60% sideslopes of till material. To prevent sloughing into a small creek build a bulwork on lower side of the road (BMP 14.5 E2,3; 14.7 E1). Endhaul all excavated material to a designated disposal site (BMP 14.12).ROAD LOCATION: Point A would have a rock ramp for water access. Between point A and B the road should be into the hillside as far as possible to prevent construction on the beach. There should be minimum excavation due to blue clay in the area between the creek and bulwork (BMP 14.7 E1,2). Facilitate Road closure through location and design of first segment.ROCK PITS: Pit A may have visual concerns. Pit will be designed if possible with a buffer to blend into the surrounding vegetation. The pits on this road are located at least .25 miles from Frank Creek. There are large benches and muskegs between the pits and streams so potential loss of water quality is small (BMP 14.18). To further reduce the potential, during periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended thus reducing vibration that may induce mass movement (BMP 14.7 E3,4).STREAM CROSSINGS: There are 2 stream crossings which will require a 36" cmp or larger (BMP 14.9; 14.17).FUTURE NEEDS: None, road should be closed to motorized traffic including ATVs.VEGETATIVE MGT: Use minimum clearing widths which still provide safe travel. Minimum width will be 10 feet beyond the catch point of the road.TIMING RESTRICTIONS: On all fish streams there shall be a timing window for any road construction (BMP 14.6 E4; 12.6; 13.3).MONITORING NEEDS: Monitor effectiveness of road closure.

I.D.

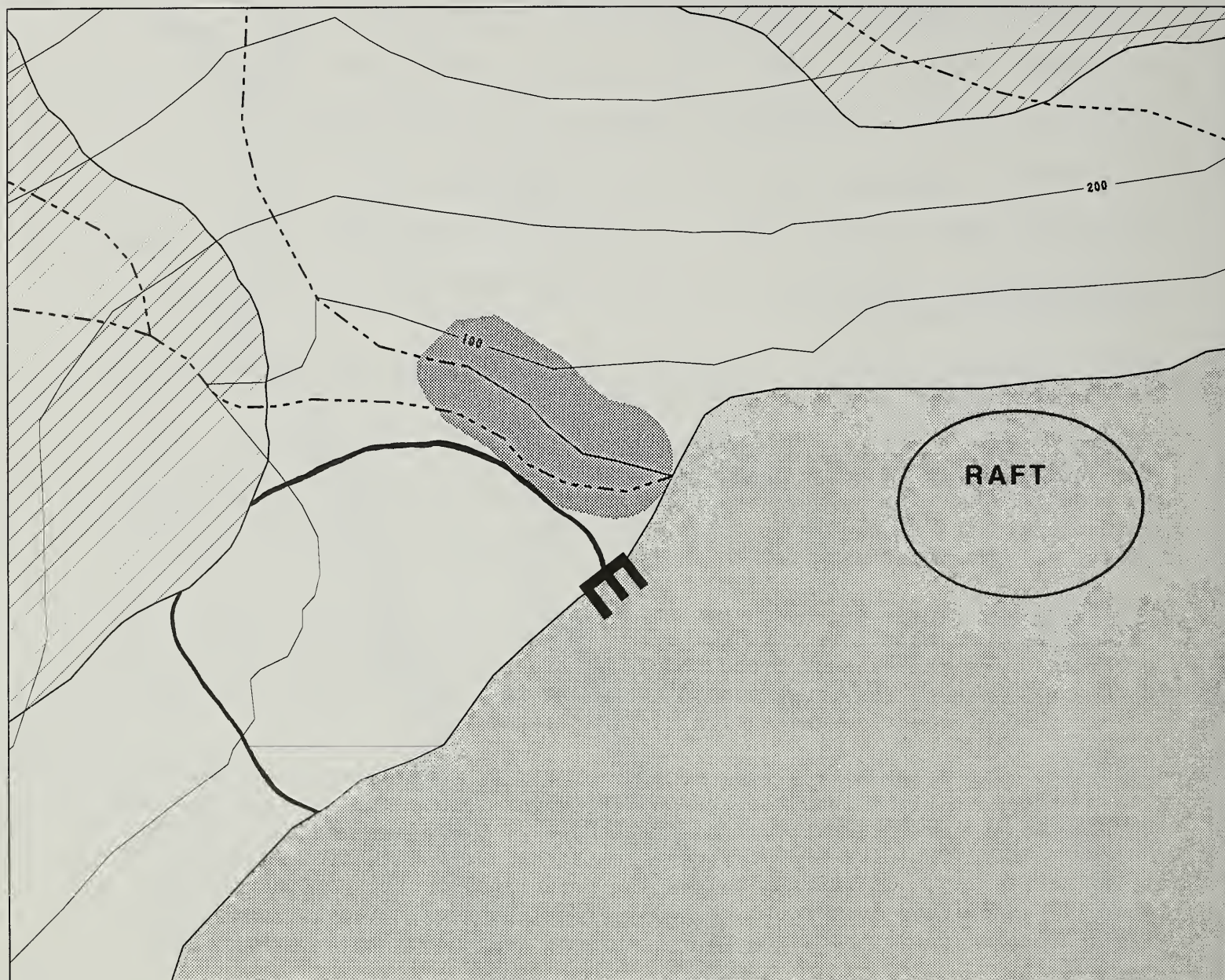
TEAM: _____

Recommended

By: _____ Date: _____

Interdisciplinary Leader

MINER'S CREEK LOG TRANSFER FACILITY



1" = 300-ft.

M LANDING

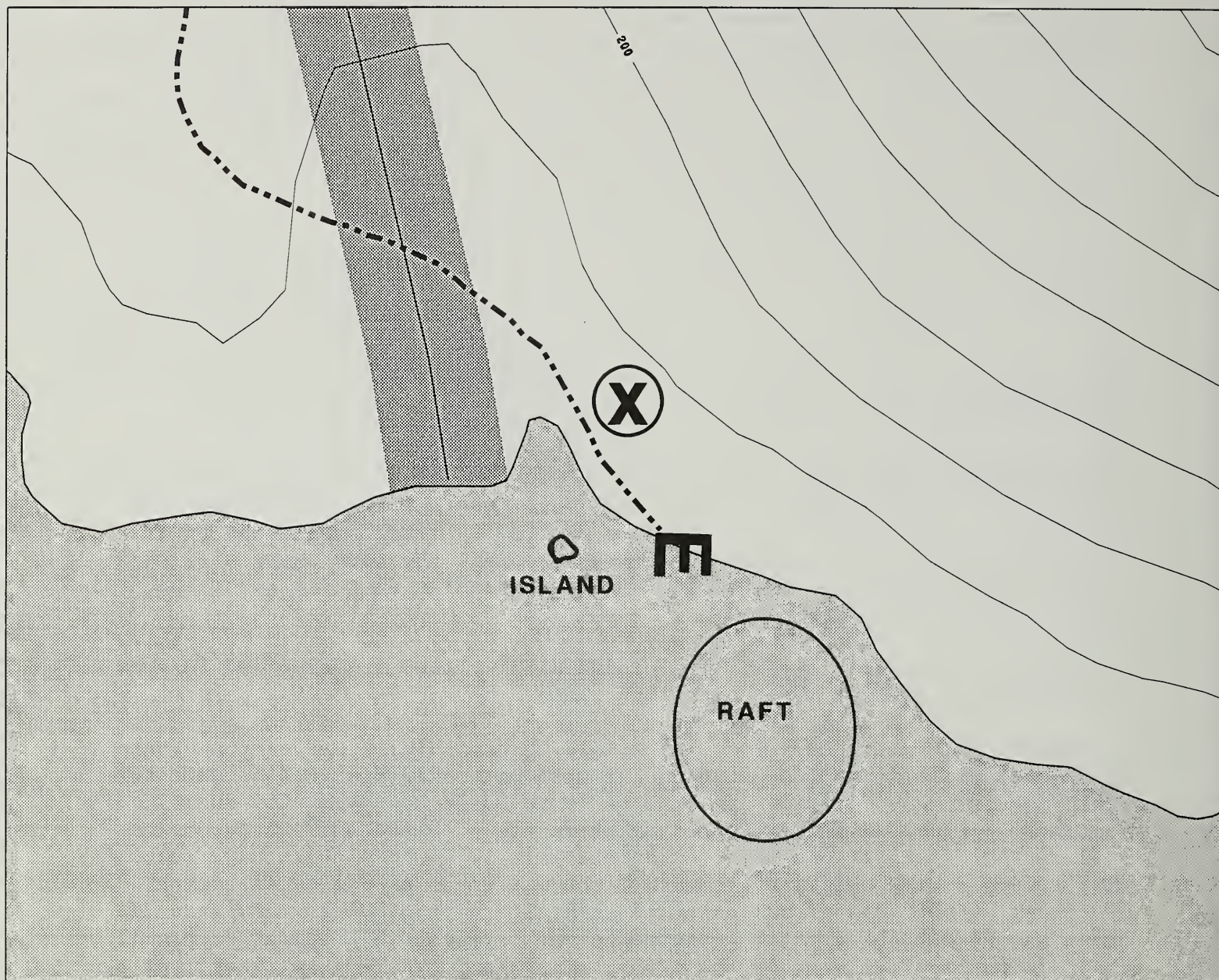
DESCRIPTION: This log transfer facility is located west of Miner's Creek in marine and saltwater influence zones. Two shot rock ramps will be constructed, one for watering the logs the other for dewatering the logs. Ramps would extend from the sort yard to below low tide. A three acre, terraced sort yard to be located adjacent to and behind the ramps. Sort yard will be adjacent to Unit 6 and yard is estimated to be less than 4 acres in size. The LTF would be located on an alluvial fan approximately 70 to 100 feet from the class III stream and about 150 feet from the class I stream (see map). The site is located on the western edge of a commercial shellfishing area that is considered to be moderately productive. It is an intermediate risk to biological productivity and the displacement of commercial shellfishing operations (compared to the other proposed LTF sites). Use will likely only cause temporary displacement of crabbers during the 1-2 year operation. This area would water and dewater up to 11.6 million board feet, depending upon the alternative selected. The intertidal zone is steep, composed of coarse substrate and drops abruptly to depth (See Appendix E LTF Dive Report).

DESIRED FUTURE CONDITION: - Short term: Area to be used to place logs in the water. This will consist of a road, two shot rock ramps to below mean low water and a small float. No measurable decline in water quality as applicable to state water quality standards. Texture change and form shape will be visible and may dominate the view. Minor decrease in wetted area since little fill is needed for ramps.

Long term - Sort yard area will be revegetated. Trees are expected to grow on the shot rock facility above high high tide.

PRESCRIPTION: Follow BMPs 14.4, 14.25, 14.26 and 14.27. Harvest necessary vegetation, keeping area cleared to the minimum. Minimize disturbance to marine environment. Design log transfer site so logs enter water non violently. Leave selective buffer of trees about 50 feet wide between sort yard and the class III stream. This buffer is to help maintain bank stability (BMP 12.6a). This buffer of trees will be marked on ground by fisheries, hydrology, timber and visual resource specialists. South bank of class III creek may need to be armored to maintain bank stability. Closest ramp will be about 70 to 100 feet west of the class III stream. There is a class I stream east of the class III stream and the end of ramp will be approximately 170 feet from the class I stream. Class I stream will have a 100 foot buffer as required by Tongass Timber Reform Act. Locate ramp to minimize impacts to class I stream (BMP 12.6). Consider using native species for revegetation if available. Some trees outside the sortyard clearing limits will be cut to provide flight corridors and a safe working area. If these trees are within the 100 foot buffer of the class I stream or in the beach fringe, check with a fish/wildlife biologist. Limbs and slash will be burned during the logging operation.

FRANK CREEK LOG TRANSFER FACILITY



1" = 300-ft.

⊗ ROCK PIT

▤ LANDING

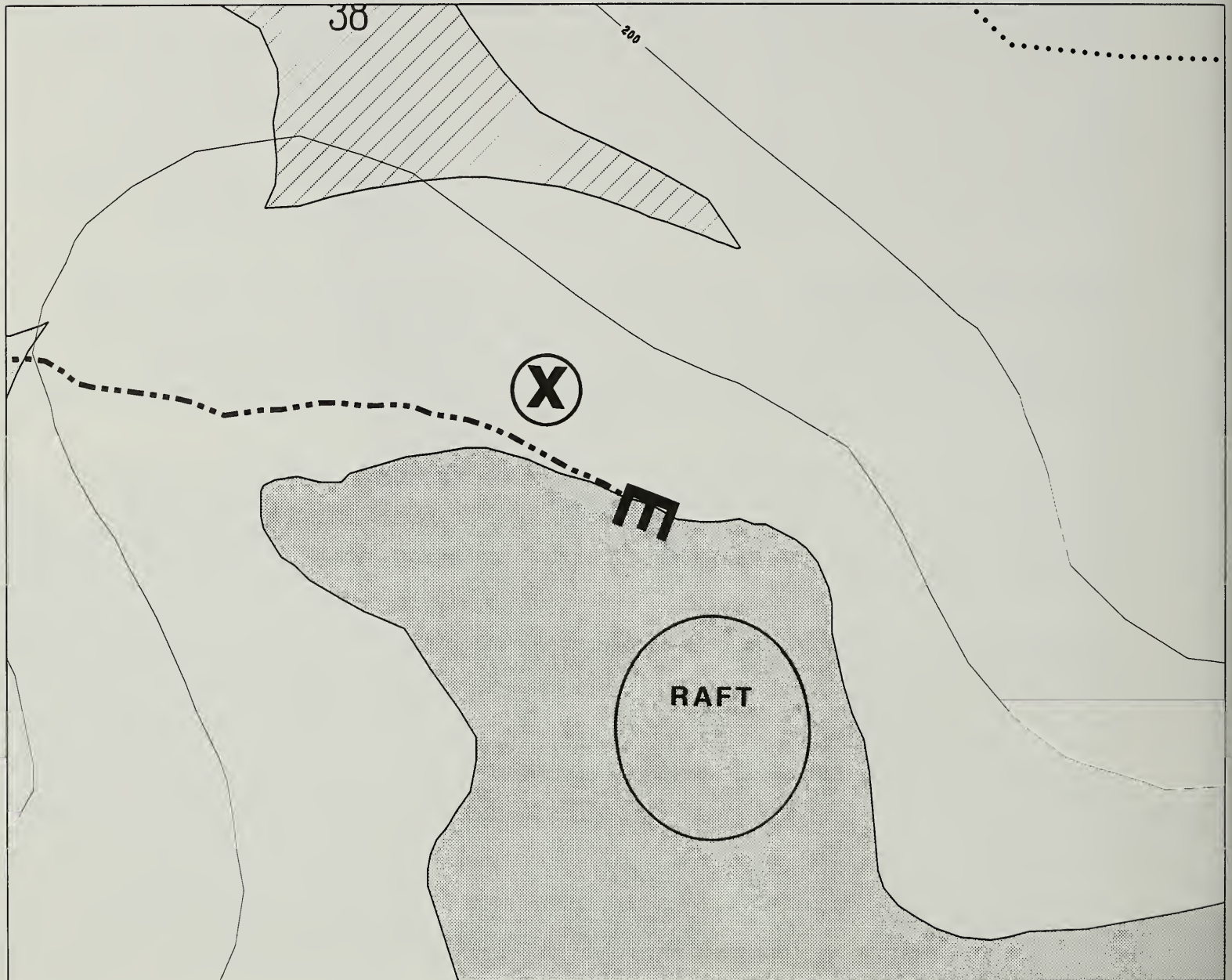
DESCRIPTION: This log transfer facility is located east of Frank Creek in marine and saltwater influence zones. The intertidal zone is the most extensive of the 3 LTFs and is associated with a productive subtidal area used for commercial shellfishing. There is a small island which is connected to shore by an intertidal area. Moving the site to the west would impact the small estuary of the class 1 fish stream. This site has the greatest risk to biological productivity and would create the most displacement of commercial shellfishing operations. The site would be used to water about 8 million board of timber. Helicopter landing, sorting and landing would be accomplished in the upper areas of the road system, approximately .5 miles from the LTF.

DESIRED FUTURE CONDITION: - Short term: Area to be used to place logs in the water. This will consist of a road, temporary shot rock ramp to below low water and a small float. Improved access for humans while sale is active. No measurable decline in water quality as applicable to state water quality standards. Texture change and form shape will be visible and may dominate the view. Decrease in wetted area while ramp is in place.

Long term - Area will be revegetated. Trees are expected to grow on the shot rock road and facility above high high tide. Road to access units will be closed at first appropriate cut bank. Area excavated for road will be returned to natural contour for the visible distance. Location selected be have sideslope steep enough to stop ATVs from traversing.

PRESCRIPTION: Follow BMPs 14.4, 14.25, 14.26 and 14.27. Harvest necessary vegetation, keeping area cleared to the minimum. Design road to facilitate closing when sale complete. Minimize disturbance to marine environment. When sale is completed remove rock from ramp and return to the rockpit and spread on floor of pit. Objective is to return the wetted area to original size and the beach to the natural contour. Design log transfer site so logs enter water non violently. Consider using native species for revegetation if available.

TOM CREEK LOG TRANSFER FACILITY



1" = 300-ft.

⊗ ROCK PIT

▤ LANDING

DESCRIPTION: This log transfer facility is located east of Frank Creek in marine and saltwater influence zones. Estimated volume to pass over this facility is 11 million board feet. This LTF would be part of the transportation system. The intertidal zone is short, steep comprised of coarse substrate, and drops abruptly to depth. This site poses the least potential for adverse impact on commercial shellfishing operations and biological productivity.

DESIRED FUTURE CONDITION: - Short term: Area to be used to place logs in the water. This will consist of a road, shot rock ramp to below mean low water and a small float. Improved access for humans while sale is active. No measurable decline in water quality as applicable to state water quality standards. Texture change and form shape will be visible and may dominate the view. Decrease in wetted area while ramp is in place.

Long term - Area will be revegetated. Trees are expected to grow on the shot rock road and facility above high high tide. Road to access units will be closed at first appropriate cut bank. Area excavated for road will be returned to natural contour for the visible distance. Location selected be have sideslope steep enough to stop ATVs from traversing.

PRESCRIPTION: Follow BMPs 14.4, 14.25, 14.26 and 14.27. Harvest necessary vegetation, keeping area cleared to the minimum. Design road to facilitate closing when sale complete. Minimize disturbance to marine environment. When sale is completed remove rock from ramp and return to the rockpit and spread on floor of pit. Objective is to return the wetted area to original size and the beach to the natural contour. Design log transfer site so logs enter water non violently. Consider using native species for revegetation if available.

Appendix B

Monitoring and Improvement Projects

Monitoring

Monitoring is designed to determine if resource objectives have been met. Monitoring helps us measure how well the predictions we made were realized and if we achieved the desired results. The following is a list of monitoring projects we are considering if an action alternative is selected by the Forest Service.

BMP Implementation- Through our Memorandum of Agreement (MOA) with the State of Alaska, BMP implementation and monitoring assure compliance with the goals of the State's Water Quality Standards and the Clean Water Act. Successful implementation of the MOA satisfies State and Federal nonpoint source pollution requirements. Any units or roads implemented would go into a unit and road pool at the area level where a random sample of 20% of the units and roads are selected for monitoring. Monitoring consists of field visits to the sampled units and roads by hydrologist, soil scientist, sale administrators, engineers and other resource professionals. This review occurs once after the activity is complete and the information is incorporated into the Stikine Area BMP Monitoring Report. Costs are variable and funding is part of routine work.

Implementation & Effectiveness of Overstory Removal Harvest Methods- Under an action alternative we would monitor if harvest prescriptions were implemented according to information contained on the unit cards (Implementation).

Permanent plots would be located in the units before harvest in order to measure vegetation parameters before and after harvest. This would be done with the objective of determining the vegetation response (both overstory and understory) to the harvest method. Plots would then be measured over time as funding becomes available. After harvest, we would visit the site and evaluate this information to determine if we achieved the desired objectives of these prescriptions (Effectiveness). Objectives to be evaluated include: structural diversity (number, size and types of trees left per acre); Visual Quality (measured by the Visual Resource Management System); growth and condition of understory. The bulk of this monitoring would take place before and within the first two years after harvest. Wildlife biologists, silviculturists and Landscape Architects will participate. Estimated costs are \$6,000 per year.

LTF Bark Accumulation- This monitoring would determine the size of the area affected by bark deposition. If LTF sites are implemented they will be surveyed by divers once during the permit period.

Regeneration Surveys- These surveys are routine surveys conducted during the first and thirds years after harvest to determine if adequate trees are regenerating or releasing in harvested units. Recommendations for planting trees are based on these surveys and ensure that the units are adequately "stocked" with trees within five years.

Streamside Buffers-

Monitoring is an integral step in the application of *Best Management Practices* (BMPs). Monitoring and evaluation provide a feedback loop to help adapt management practices to changing conditions in order to attain the desired future condition. Monitoring offers an early detection mechanism should corrective actions be needed due to unsuccessful protection measures. Three types of monitoring exist:

- 1) Implementation Monitoring: "Did we indeed do what we said we would do?"
- 2) Effectiveness Monitoring: "Did the thing we said we would do accomplish what we expected it to?"
- 3) Validation Monitoring: "Is there a better way to accomplish the objectives, achieve the desired future condition?"

The establishment of streamside buffers is just one of many water quality protection measures collectively known as *Best Management Practices* (BMPs). The discussion which follows focuses solely on the monitoring of buffers as a riparian protection measure.

Implementation Monitoring of Streamside Buffers- Campbell buffers will become part of a Wrangell District-wide buffer pool from which individual buffers will be randomly selected for BMP implementation monitoring. This will be an interdisciplinary review conducted from the Forest Supervisor's Office which will examine, in the field, how well this protective measure was applied to ground conditions.

Effectiveness Monitoring of Streamside Buffers- Effectiveness monitoring of buffers is a specific resource-oriented project level task which will be conducted by District fisheries personnel with assistance from Area hydrology personnel.

The primary issue associated with streamside buffers appears to be windfirmness or susceptibility to windthrow. The issue can be described by a number of questions:

"What features of the landscape contribute to long-term buffer stability?"

"Does a buffer necessarily lose any/all of its effectiveness if it is partially/entirely windthrown?"

"What stream or riparian attributes determine buffer effectiveness?"

Some insights to answers to these questions are hoped to be gained by implementing the two-stage buffer effectiveness monitoring plan in this section. The two linked stages to be monitored are buffer stability and channel complexity. The basic assumption of the monitoring plan is that an intact or stable buffer of no less than 100 feet in width is an overall effective buffer.

The objective of the monitoring plan is two-fold: 1) determine the relative stability or windfirmness of the Campbell buffers by measuring buffer windthrow characteristics; and 2) determine whether the buffers were effective in maintaining channel complexity by measuring fish habitat features. The monitoring procedure is detailed in the plan.

Sediment and water temperature were not selected to be monitored because these components of fish habitat can be highly variable over time and there is no baseline or pre-project data for comparison or determination of the natural range of variability of these features. Many of the streams draining into the Bradfield Canal have a naturally high fine sediment load for at least a portion of their length.

It is assumed that as long as there is adequate large wood available to the stream ecosystem, channel complexity and biodiversity will be maintained by natural processes of sediment sorting, transport, and storage facilitated by large roughness elements such as wood, boulders, and bedrock. Because of the limited extent of streamside buffers compared to the overall length of stream, variation in water temperature is not anticipated to be a habitat degrading factor affecting biodiversity in the Frank Creek aquatic ecosystem.

The establishment of streamside buffers is a riparian area protection measure (BMP 12.6, 12.6a) used to protect water quality as it relates to fish habitat as the beneficial use of water. Protection of stream channel complexity and biodiversity is achieved by maintaining physical and biological linkages between streams, riparian zones, and upland areas. Transfer processes which comprise these linkages include those that deliver woody material, coarse sediment, and organic matter.

The purpose of this monitoring plan is to determine the effectiveness of streamside buffer strips used in the preparation and administration of the Campbell Timber Sale. Effectiveness will be measured in terms of maintaining habitat complexity and biodiversity at the stream ecosystem level.

Objectives:

Buffer Stability. The assumption has been made that in order for a buffer to be effective in maintaining the production potential of fish habitat, it must remain relatively stable over time. Based on this assumption, it would seem to follow that a buffer loses effectiveness in proportion to the stability it loses in terms of windthrow.

The purpose of buffer stability monitoring is to determine the relative integrity, in terms of windfirmness, of established streamside buffers over time in order to provide some insight to better buffer design and layout.

Stream Channel Complexity. Although windthrow is one of the hillslope processes linked to stream channel complexity, there is a concern that sedimentation resulting from erosion of streamside areas exposed by windthrow may reduce the overall effectiveness of buffers in terms of maintaining habitat complexity and biodiversity.

The purpose of channel complexity monitoring is to determine whether, or to what degree, windthrow of buffers reduces channel complexity and thus the production potential of fish habitat.

Parameter Selection:

The selection of appropriate aquatic and riparian parameters to be monitored was based on:

- 1) A review of *Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska*, EPA 1991;
- 2) A review of the literature pertaining to BMPs, fish habitat, fish populations, and cumulative effects in Pacific Northwest and Alaskan stream systems;
- 3) Consideration of the general lack of baseline data to determine the natural range of parameter variability over time; and
- 4) The likelihood that the scale and scope of the monitoring would stand a reasonable chance of being accomplished within the framework of personnel and budgeting constraints.

Buffer Stability. A condition index for each TTRA buffer will be based on the following factors:

- 1) **Percentage Windthrown.** The amount of total windthrow will be expressed as a percentage of the total buffer area.
- 2) **Percent Channel Affected.** The percent of windthrow either within or directly along the stream channel will be determined by estimating the length of stream affected by windthrow compared to the total stream length associated with the buffer.
- 3) **Windthrow Pattern** will be classified using the following categories:
 - a. Along buffer margins
 - b. Scattered or patchy
 - c. Concentrated blocks
- 4) **Orientation** of windthrown tree stems will be described relative to the stream as:
 - a. Random
 - b. Parallel
 - c. Perpendicular
 - d. Diagonal

These factors have been selected to characterize buffer condition over time as a reflection of relative buffer stability.

Channel Complexity. Simplification of stream habitat complexity has been one of the most pervasive cumulative effects of past forest practices and likely has contributed to significant changes in fish communities. Attainment of individual water quality standards, such as dissolved oxygen or water temperature, may well not be adequate to achieve the goal of restoring or maintaining natural levels of complexity at the stream ecosystem level. This monitoring plan focuses, therefore, on the following three parameters:

1. *Stream Habitat Units.* Using a modified version of the *Basin-wide Visual Estimation Technique* (BVET) and hierarchical stream habitat unit classification system, pool, riffle, and streambank habitats of windthrown buffer (treatment) reaches will be estimated and compared with untreated (control) reaches (Hankin and Reeves, 1988). Residual pool depth and volume associated with large wood and area of undercut banks will be visually estimated. Observer bias inherent to estimates will be adjusted by random sample measurement to improve accuracy. Numbers of pieces of large wood associated with pools will be noted. Habitat unit data will be summarized and compared in terms of frequency, distribution, sequence, and complexity.

2. *Large Wood.* Using the BVET mentioned above, large wood information will be gathered along treatment and control reaches and data summarized by:

log w/rootwad)	piece assemblages (single, 2-4, 5-10, 10+)
	piece description (branch, top, bole, rootwad, whole tree,
	rootwad attachment
	diameter class (4-20 in., 20+ in.)
	length class (>3 ft. but <5 ft., >5 ft.)
embedded)	channel position (bridge, collapsed bridge, ramp, drift,
	channel association (mid-channel, streambank, bank-to-bank)
	channel width affected (<1/3, 1/3-2/3, >2/3)
	channel effect (pool, sediment storage, flow deflection, none)

As with habitat units, large wood will be characterized and reaches compared by frequency, distribution, sequence, and complexity. These data will be gathered to provide insights into the potential long-term effects of large wood recruitment via buffer windthrow on overall stream habitat complexity (Platts, et. al., 1987).

3. *Streambank Stability.* Visual estimates of streambank condition and area of coverage will be made concurrently with the habitat unit and large wood estimates. This information will be gathered to assess the effects of streambank windthrow on bank erosion/simplification processes.

Procedures:

Buffer Stability. Aerial reconnaissance will be used to survey buffer stability and airborne video will be used to record image data for annual comparison and detection of changes in buffer integrity. Pre-project implementation data will be acquired either by airborne video or scanned from existing aerial photos. Analysis of data will be computer-assisted using image processing software (MIPS).

Channel Complexity. The Class I length of Frank Creek will be mapped using GPS. Reach boundaries will be defined by geomorphic controls which will be labeled in the GPS-generated mapping. The resolution of field-grade GPS is not adequate for mapping individual habitat units, but the frequency and distribution of large wood, especially accumulations, may be conducive to GPS mapping and spatial monitoring.

Pre-project implementation surveys of the channel complexity parameters described above will be conducted to provide baseline information.

Once channel-influencing windthrow is detected by aerial reconnaissance as part of buffer stability monitoring, instream measurement using the BVET will be performed in the treatment reach/es and at least one untreated reach downstream and one reach upstream which is both untreated and unaffected by buffer windthrow upstream. Control reaches to be measured will be of the same stream order and same channel process group where possible. Measurements will be taken during one-third bankfull flows or less.

Monitoring Frequency:

Buffer Stability. Initial data gathering to establish a baseline will be completed prior to harvest. Subsequent flights will be made annually thereafter. Data acquisition flights may be made following severe windstorms as budgets allow.

Channel Complexity. Initial data gathering, GPS map generation, and reach delineation will be completed prior to harvest. Subsequent sampling will be dictated by severe windstorms and changes in buffer integrity revealed by stability monitoring. Surveys after the initial instream windthrow survey should be made at 2 to 3-year intervals or following severe windstorms.

Quality Control:

Standard techniques for making estimates and for collecting field data will be used for channel complexity parameters described above. Field crews will receive adequate training by experienced biologists and technicians. Observer bias will be compensated by random sample measurement of each habitat unit type and data will be adjusted accordingly per the Hankins and Reeves methodology (1988). Standardized data recording forms will be used. All data will be entered and stored in a PC relational database (Microsoft Excel). Quality control for data entry and analysis will be the responsibility of the District Fishery Biologist.

Data Analysis, Evaluation, and Interpretation:

Data analysis will focus on determining long-term trends in habitat complexity, and large wood and streambank dynamics.

Reporting:

Field data will be reviewed and entered into the District monitoring database managed by the District Fisheries Biologist. Data analysis will be summarized and submitted to the Supervisor's Office annually for incorporation into the Stikine Area's annual BMP monitoring report.

Cost Estimates (annual; overhead excluded)= \$7,550

The cost of collecting pre-project baseline data is expected to be the most expensive. Actual channel complexity monitoring costs will depend on extent and pattern of windthrow.

References:

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Hankin, D.G., and G.H. Reeves. 1988. Estimating Total Fish Abundance and Total Habitat Area in Small Streams Based on Visual Estimation Methods. *Canadian Journal of Fisheries and Aquatic Sciences* 45(5): 834-844.

MacDonald, L.H., A.W. Smart, and R.C. Wissmar. 1991. Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska. U.S. Environmental Protection Agency, Water Division, NPS Section, Seattle, WA. EPA/910/9-91-001. 166p.

Platts, W.S., C.Armour, G.D. Booth, M. Bryant, J.L. Bufford, P. Cuplin, S. Jensen, G.W. Lienkaemper, G.W. Minshall, S.B. Monsen, R.L. Nelson, J.R. Sedell, and J.S. Tuhy. 1987. Methods for Evaluating Riparian Habitats with Applications to Management. General Technical Report INT-221. USDA-Forest Service, Intermountain Research Station. 177p.

Potential Improvement Projects

If an action alternative is selected these projects may be listed in the Campbell Timber Sale Area Improvement Plan. All projects comply with Forest Service K-V Handbook direction (FSH 2409.19). K-V funding for projects other than Regeneration Surveys and Tree Planting would be dependent on the amount of sale revenues. The following projects are **not** listed in order of K-V funding priority.

Natural Regeneration Surveys- These surveys identify the amount of natural regeneration established after harvest.

Tree Planting- Harvested stands which are not expected to receive adequate regeneration will be planted. Units which have a higher probability of needing planting are identified on unit cards.

Fishery Enhancement- An opportunity for enhancement exists in the upper Tom Creek drainage. Modification of small falls by blasting could provide access for steelhead and coho to approximately 2.5 miles of spawning and rearing habitat.

The substrate of the lower two-thirds of Tom Creek is noticeably uniform and the channel contains few large gravel-cleaning and pool-scouring instream objects such as logs, rootwads, and boulders. There is the potential to insert such structural elements into the channel in order to create more varied habitat. At a minimum, the coarse objects would provide and create cover. Large boulders would be preferable to large wood because it appears wood is carried downstream by ice flows. Rock could be blasted where the stream goes near rock bluffs or boulders could be transported by helicopter.

First- and second-order tributaries along the east side of the lower 1 mile of Tom Creek provide limited rearing and overwintering habitat but may provide critical refuge during floodflows and ice flows. Although beaver inhabit this reach, no active beaver dams have been found in these streams. Rearing capacity of these tributaries could conceivably be increased by installing log structures which would impound water behind them, but still allow ingress and egress by various age classes. The duration of effectiveness could be reduced below normal due to the natural erosion of deep fine-textured deposits which the streams drain.

Wildlife Travel Corridors- There may be some potential to experiment with establishing slash free corridors for elevational wildlife migration under some alternatives. These would be established by clearing slash in long units that run perpendicular to the contours. The effectiveness of these corridors would also be evaluated.

Information Brochure- A brochure could be developed which explains some of the natural, geologic and management features of the Bradfield Area.

Appendix C

Public Comments and Responses

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF GOVERNMENTAL COORDINATION

☐ SOUTHCENTRAL REGIONAL OFFICE
3601 "C" STREET, SUITE 370
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☐ CENTRAL OFFICE
P.O. BOX 110030
JUNEAU, ALASKA 99811-0300
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☐ PIPELINE COORDINATOR'S OFFICE
411 WEST 4TH AVENUE, SUITE 2C
ANCHORAGE, ALASKA 99501-2343
PH: (907) 278-8594/FAX: (907) 272-0690

August 5, 1993

Ms. Meg Mitchell
Team Leader
Tongass National Forest, Stikine Area
P.O. Box 51
Wrangell, AK 99929

SENT VIA FAX, 874-2095

Dear Ms. Kimbell:

SUBJECT: CAMPBELL TIMBER SALE DRAFT EIS
STATE I.D. NO. AK930524-33J
NEPA REVIEW

The Division of Governmental Coordination (DGC) has completed coordinating the State's review of the draft environmental impact statement (DEIS) for the Campbell timber sale, according to the National Environmental Policy Act (NEPA). We appreciate the opportunity to participate at this stage of planning, and offer a consolidated response on behalf of the State resource agencies. As this review was conducted to satisfy the requirements of NEPA, the State comments include a broad range of issues.

Ultimately, per 15 CFR 930, Subpart C, the timber harvest activity will be required to be consistent to the maximum extent practicable with the standards of the Alaska Coastal Management Program (ACMP). At the time the USFS submits a federal consistency determination to the State, the State will conduct an ACMP review. Therefore, the State is taking advantage of this opportunity to also preliminarily address potential ACMP issues.

The State previously participated in a scoping review in 1992 under State review No. AK920407-07J. Also, individual State resource agency comments on the DEIS were previously submitted directly to the USFS in a timely manner.

The proposed action is to remove timber with a helicopter from the project area, which is on the north shore of the Bradfield Canal, southeast of Wrangell, and to develop a transportation system in the project area. Generally, a road system, sort yard, logging camp, and one or more log transfer facilities (LTFs) will likely be needed in the project area. The area being considered for harvest includes approximately the southern 1/3 of the VCU (value comparison

unit) 510, which is currently allocated to a LUD IV (intensive development of natural resources with a primary emphasis on commodity or market values) per the Tongass Land Management Plan. However, the draft EIS for the TLMP revision has alternatives which allocate the project area to different uses; thus, this DEIS includes alternatives which would not foreclose on implementing the revision alternatives should a decision on the new forest plan be made during the analysis of this project, as well as standards and guides from the revision which are compatible with the current forest plan.

Alternative F is the preferred alternative, which would harvest a total of 15.9 MMBF from 701 acres, retain 950 acres of old growth, construct 1.3 miles of road, and locate log transfer facilities at Frank Creek and West Face. This alternative would provide a single entry into the project area and concentrate retained old growth acres within the Tom Creek watershed. It would fragment existing blocks of old growth, shifting the habitat supply to blocks within the Harding and Marten Creek watershed in the north Bradfield landscape. It would predominantly affect the west face and the freshwater and upland zones of Frank Creek. After the activity, the road would be closed and the LTF would be rehabilitated. The established pattern of use would remain unchanged in the Tom Creek watershed, while roaded and hike-in recreation opportunities would be enhanced in the Frank Creek area.

NEPA COMMENTS

DFG has the following NEPA comments:

Wildlife

DFG concur with the following mitigation measures for wildlife: avoiding timber harvest in beach or estuary fringes, the closure of all roads, the timing restrictions on harvesting, helicopter guidelines, and the use of a floating logging camp.

Wildlife/harvest volumes

DFG noted that none of the units appear to be located in volume class 4 timber stands. DFG comments that the use of helicopter logging techniques could make this a viable method of harvest in low volume stands with reduced effects on wildlife. This technique has been used to harvest scattered high value trees in low volume stands on private lands in southeast. This may necessitate selection of some fairly large units, which appear excessive on maps, but with selective harvest of a comparatively small number of trees, could minimize resource impacts. The State urges the Forest Service to consider this option to replace units in high value goat, and deer winter range or brown bear habitat.

Similarly, in all units, we urge the Forest Service to leave larger DBH trees (above the DBH size threshold established for the units) that have high value for wildlife yet low value as timber.

Wildlife/retention

DFG is pleased the Forest Service has taken this step in designating retention, but is disappointed this was a unilateral effort rather than involving expertise of ADFG and USFWS biologists. They are also disturbed that different alternatives identify different areas for retention. Maximum benefits for wildlife are best achieved by selecting the most important wildlife habitat areas and utilizing them as a constant in all alternatives. The Forest Service can best meet this objective by selecting the areas for retention before units are even identified in the planning process.

Wildlife/fragmentation

DFG compliments the ID team for including the discussion and map on forest fragmentation. However, the map (figure 4-2) is hard to read at the scale presented. Proposed harvest units would stand out better on a colored map.

Timber inventory database

Understanding that the TIMCLU soils database is the inventory database used for the habitat capability models and harvest by timber volume class calculations, DFG points out that other areas of the Tongass use the TIMTYP database. For site-specific information, the TIMTYP database has been shown to agree with field exams less than 50% of the time. We are unaware of a study on the reliability of the TIMCLU database for site-specific application. DFG does not favor one database over the other, but if the limitations of databases used for wildlife analyses are presented in NEPA documents, those used for timber analyses should also be included.

DEC has the following NEPA comments:

Method of impact analysis

The EIS used an excellent approach to the analysis of the potential impacts of timber sales, as well as the identification of resource management needs in an area. This approach is soundly based upon the individual management needs of different types of ecological zones. DEC also found the emphasis on selective harvesting to be refreshingly different. This area could certainly be a good test case for a small sale that is entirely composed of units that are selectively harvested and helicopter yarded.

Consideration of other alternatives

DEC believes that the no-action alternative should be seriously considered in this case. First, the area is small, producing a small volume of timber under relatively difficult operating conditions. If the sale is designed for purchase by a small purchaser/operator, then the reliance on helicopter logging seems inappropriate. Also, there is apparently little or no opportunity for future entries, making the area a poor choice for conversion to timber production. Finally, there is, in DEC's opinion, a greater uncertainty about the impacts of the sale on fresh and marine water than is expressed in the DEIS. DEC forest practices staff visited the site last summer and left with the opinion that there are serious concerns about these impacts.

If the no-action alternative is not chosen, then a more thorough analysis of the potential impacts to fresh and marine water quality is needed to demonstrate that the sale will have minimal impacts on these environs. In particular, the location of the log transfer facilities, as well as the excavation needed to approach these facilities, was not adequately discussed in the DEIS. Also, the proposed LTF sites do not meet some of the important criteria for LTF location recommended by the Timber Task Force.

Referring to the forest practices trip report for the DEC inspection of the project area last year, site 2 (Frank Creek) and site 6 (Tom Creek) are proposed for construction. DEC expressed little concern for site 6, apart from potential impacts from the road building that will be needed to access the site. However, quoting from the report: "Site 2 does not appear to be workable, due to the presence of blue clay, and since a large amount of excavation would likely be necessary." The DEIS analysis is not sufficient to allay the concerns expressed in the inspection report, and does not adequately display projected road/LTF impacts.

If the no-action alternative is rejected, then alternative D would seem to be preferable to alternative F. Alternative D not only has lower potential water quality impacts, but has a greater projected net monetary return. The lower potential for water quality impacts primarily results from the absence of roads and LTFs. Alternative D also would provide an opportunity to explore the impacts (and the silviculture) of a timber sale that is designed entirely for selective harvest and helicopter yarding.

Page-specific comments

Page 1-8. In the last paragraph the Forest Service states that younger age class forests provide "vegetative diversity [and] forage for wildlife." DFG states that in actuality, second-growth forests have less vegetative diversity than old growth and do not provide as much forage for wildlife. This statement needs to be changed in the FEIS.

Page 2-21. DFG states that the Forest Service should avoid calling retention of timber in the Harding River drainage mitigation for the Campbell sale. While DFG agrees that TLMP designation of VCUs as LUD II areas will benefit wildlife over broader areas, TLMP identifies retention factors in each VCU to provide for the needs of wildlife within each VCU.

Page 4-16. In Table 4-8, DFG requests that the FEIS include not only the percentage of remaining habitat capability, but also the numbers of animals estimated by the Habitat Capability Models. While this will not enable the Forest Service to predict the actual populations of species in the sale area, it will enable DFG to assess relative impacts from a sale in the Campbell area compared with other sales scheduled in the Stikine Area. Knowing if there is habitat capability for 500 bears or 5 bears in the study area will help us assess the significance of the loss of habitat capability, both in the sale area, and as Forest-wide cumulative impacts. While DFG recognizes the models were never intended to predict actual populations at any given time, they do give the best current estimate of the numbers the habitat could support over the long term.

Also, DFG points out they have noticed a recent trend in Stikine Area NEPA analyses to disavow the outputs of these models. They expect the models will be modified as techniques are developed to refine their use or new knowledge on species' habitat requirements is gained. However, at present, they provide the best current estimate of average long-term population ceilings for MIS on the Tongass. They were accepted for use in the TLMP Revision and, thus, DFG sees no reason why they should not be used in project level analyses.

Page 4-42. DFG advises that the use of the 5.7 percent harvest rate for brown bears from Miller and Miller (1990) may be inappropriate in this case. As indicated in the DEIS, the Millers' rate is contingent on optimum conditions for bears...excellent habitat, high reproductive rates, and low natural mortality. Because DFG knows very little about the Campbell Timber Sale bear population dynamics and a thorough assessment of habitat quality has not been done, a more conservative harvest rate should be assumed. DFG recommends use of the same sustainable harvest rate for brown bears as used in the TLMP revision -- 4 percent. For the same reason, the harvest rate for black bears in the DEIS may be too high. DFG recommends using the conservative rate of 7 percent sustainable annual harvest that is used in the TLMP revision.

Also on page 4-42, the final paragraph on brown bear abundance and distribution makes the assumption that because "most of the forest will be maintained in an old growth condition," brown bear distribution will not be significantly affected by logging. DFG is concerned about the possible effects of human disturbance and habitat loss on bear behavior during and possibly after logging. Six units (9, 10, 11, 12, 14, and 15) appear to harvest high value brown bear habitat along Frank's Creek (differing scales of maps hamper this analysis).

This, combined with long term effects of the physical presence of a road into this area, suggest it is reasonable to expect localized changes in distribution and/or abundance may occur.

Maps

The DEIS contains a good selection of maps. Unfortunately, they are presented in two different scales. It was extremely difficult to compare wildlife habitat maps with those of the alternatives or the ecological zones. Also, it would facilitate overlaying maps of different resources if maps had no text or other printing on the reverse side.

SECTION 319 CLEAN WATER ACT/USFS-DEC MOA COMMENTS

Appendix A, unit and road cards

1. Regarding the lake buffers, DEC asks if the potential for windthrow of these buffers was thoroughly explored. The buffers appear to be exposed to prevailing winds.
2. If an action alternative is chosen, please summarize and display, on a unit and road-specific basis, any changes to units and roads between the DEIS and the FEIS, along with the reasons for the changes (see, for example, the FEIS for the North and East Kuiu timber sale). Please include any site-specific BMPs or other mitigation measures that are prescribed before the issuance of the FEIS.

Appendix B, monitoring

The proposal for monitoring stream buffer effectiveness is inadequate. DEC suggests that the ID team contact Julianne Thompson, Area Hydrologist, to work on the proposal. The proposal does not state what is meant by buffer effectiveness. ADEC feels that tracking buffer blowdown, and the factors that contribute to buffers blowing down or remaining windfirm is a good idea, and is a worthwhile project. DEC appreciates that the USFS wishes to conduct effectiveness monitoring. However, the USFS must be cautious to carefully define the project objectives, in order for the monitoring project to provide useful results. Also, DEC suggests using the EPA guidelines: "Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska" (EPA/910/9-91-001) as a guide to definition and conduct of any monitoring studies that are proposed.

PRELIMINARY ACMP COMMENTS

As indicated earlier, upon implementation of the Record of Decision (ROD) and the State's receipt of the federal consistency determination per 15 CFR 930.34, the timber harvest activity will be reviewed for consistency with the standards of the Alaska Coastal

Management Program (ACMP), according to the time allotted in federal coastal zone management regulations 15 CFR 930.35 (45 days). The ACMP review standards are, by incorporation, those of the Alaska Forest Resources and Practices Act, Alaska Statute (AS) 41 amended 1990 and regulations 11 AAC 95 as revised effective June 10, 1993. An exception is when, in accordance with AS 41.17.900(b)(2)(B), if timber harvesting or an associated activity requires State or federal authorizations, the ACMP standards in 6 AAC 80 will apply to those aspects of the project which require authorizations. Thus, comments made under this section are intended for the use of the Forest Service in completing the FEIS for the timber sale.

DFG's major concerns regarding this sale relate to harvest of high value goat winter range and road construction through unstable soils.

DFG advises that, in completing their review, they will focus on FPA Section 41.17.060, items (b)(5), (c)(1), (c)(5) and (c)(7):

Section (b)(5) states: "significant adverse effects of soil erosion and mass wasting on water quality and fish habitat shall be prevented or minimized."

Section (c)(1) states: "forest land shall be administered for the multiple use of the renewable and nonrenewable resources and for the sustained yield of the renewable resources of the land in the manner that best provides for the present needs and preserves the future options of the people of the state."

Section (c)(5) states: "there may not be significant impairment of the productivity of the land and water with respect to renewable resources."

Section (c)(7) states: "allowance shall be made for important fish and wildlife habitat".

1. Retention. DFG mentions that one way the Forest Service assures the State these standards will be met is through the designation of "retention" as provided under the current Tongass Land Management Plan. See the discussion in the NEPA comment section.
2. Goat winter range. Of particular concern is selection of units rather than designation of retention in high value goat winter range. Mountain goats are a relatively uncommon, high profile species on the Tongass which are very susceptible to disturbance by man's activities...both consumptive and nonconsumptive. A limiting factor for this species is the availability of winter range. Forest wide, high value goat winter range comprises a very tiny portion of the CFL, yet it has considerable importance for the survival of this species. DFG states they do not see any

justification for harvesting this rare habitat type which cannot be replaced for several hundred years. Long-term negative impacts from this activity do not enable the Forest Service to meet the above described ACMP standards. Thus, in order for DFG to find this sale consistent with the ACMP, the following units or portions of units must be withdrawn:

Unit 1 is one of two significant areas of high value goat winter range in high volume old growth on the south face of the ridge between Frank Creek and Marten Creek. The entire unit is identified as high value goat winter range.

Unit 2 is the other significant area of high value goat winter range in high volume old-growth on the south face of the ridge between Frank Creek and Marten Creek. This entire unit is high value goat winter range.

Portions of Units 3, 4, 5, 7 and 8 appear to be in high value goat winter range. Differences in the scale of maps which were provided restrict our ability to make definitive statements regarding which portions of the units are in this rare habitat. DFG requests the Forest Service modify these units accordingly to eliminate the cutting of any high value goat winter range.

Consideration should be given to the possibility of making adjustments to boundaries of units to maintain volume and accommodate goat habitat.

3. Erosion. The DEIS identifies areas as containing deposits of blue clay and sand left over from the last glaciation, perhaps as long as 8000 years ago. Some of these areas are still unvegetated, presumably from chronic erosion. The Frank Creek Road will pass through this area and, at one point, a "bulkwork" is prescribed on the lower side of the road to prevent sloughing into a creek which appears to be an uncataloged anadromous fish stream. The level of detail and different scales of the maps precludes DFG confirming the proximity of this site to anadromous fish habitat.

Whether the stream is a tributary to anadromous fish habitat or anadromous fish habitat itself, we are concerned with the potential for chronic erosion from this disturbance. In our experience, once sand is disturbed, it is extremely difficult and expensive to control chronic erosion at that site. DFG will need additional information to address this issue in our review of the FEIS.

4. Soil disturbance. It also appears that several units within drainages of anadromous fish habitat are located in areas where soils are comprised of sand or blue clay. The use of helicopter logging techniques should enable the Forest Service to prevent soil disturbance in these areas provided appropriate standards are adopted for these units. Units within drainages of anadromous fish streams where sand/blue clay deposits

appear to be located include units 9 and 10, and potentially, small portions of units 19 and 20. Again, this discussion is hampered by review of maps drawn to different scales. We request the Forest Service address this issue in greater detail in the FEIS.

Activities requiring other State and federal authorizations

Log transfer facilities (LTFs), sortyards, and camps are associated facilities which are normally subject to ACMP review. The State reviews projects comprehensively, covering all activities and permits in a single review. If the record of decision is able to include applications for permits for associated facilities, the State will include those in the review.

A log transfer facility is proposed for this sale to the east of Frank Creek. This portion of the project will require state and federal permits, such as Corps of Engineers, Environmental Protection Agency NPDES, a DEC 401 Certificate of Reasonable Assurance, and Department of Natural Resources tideland use. To date, resource agencies have not completed habitat surveys in order to assess habitat values at this site. DEC, as noted above in the NEPA comments, states that the information displayed about the proposed road and LTF facilities is insufficient for a meaningful analysis to be conducted of potential water quality impacts. This concern includes the approaches to the LTFs as well as the marine environment. Similarly, to date, no site has been identified for the transfer of timber from the western portion of the sale area. This site will also need to be identified and approved prior to completion of the sale.

GENERAL ADVISORIES

This document does an excellent job in describing the existing resources and the majority of the impacts from cutting in the study area. We commend the Forest Service for this effort.

DFG has the following general comments:

We are encouraged that methods of logging besides clearcutting are planned for this sale. The Forest Service will need to make sure the sale contract will enable the plans to be fully implemented. A rigorous and thorough monitoring program is also needed to evaluate if prescribed harvest techniques are effective in mitigating impacts to wildlife.

It appears this sale has the potential to reduce impacts on wildlife as compared to clearcutting. We note that leave trees or patch cuts are scheduled for a majority of the units and we encourage the Forest Service to maximize the number of larger trees retained in these units. If the Forest Service can follow the 12 inch and 16 inch DBH

guidelines combined with retention of low value trees from a commercial perspective that have high value from a wildlife perspective, we believe this sale may provide an opportunity to harvest timber with less impact on fish and wildlife habitat than conventional clearcutting.

Sincerely,

Lorraine Marshall
Project Review Coordinator

Enclosures

cc: Jim Ferguson, DEC, Juneau
Don Cornelius, DFG, Petersburg
Jim McAllister, DNR, Juneau

campbell.col

DFG SUBSISTENCE COMMENTS

Because the Campbell Timber Sale affects a small area which in recent years has not been heavily used for subsistence harvesting of fish and wildlife, our comments are limited. Overall, the planning team appears to have made good use of mapped and other analytical data available from the Division of Subsistence and other sources.

Our Subsistence Division has recently been working closely with the Forest Service to develop a more comprehensive model for evaluating the site-specific and cumulative impacts that individual timber sales may pose to subsistence harvesters of fish and wildlife in Southeast Alaska. This model was employed in the DEIS and FEIS subsistence analysis for the Southeast Chichagof Timber Sale. We found that the Southeast Chichagof documents did a very good job of depicting subsistence uses and effects of logging on these uses. We had hoped that this plan would set a standard for analyses of this type. Although the Campbell DEIS does incorporate some features of this improved method of doing subsistence analyses, this document is not as thorough as the SE Chichagof document in several critical areas. These include:

1. Subsistence is not identified as a key issue in the planning process. ANILCA is quite clear with respect to the priority of subsistence over other consumptive uses of the forest, yet even under Issue 8 (page 1-12) "The effects of the proposal on cultural resources and other social values in and around the study area", subsistence uses and values are not explicitly mentioned. This treatment implies that subsistence uses are not qualitatively different than other harvest or recreational use of the area. Failure to separate subsistence from other issues can lead to a rather convoluted discussion of impacts, as on page 4-40, for example, where visual and scenic impacts are treated in the same paragraph as subsistence 810 determinations.
2. The DEIS does not adequately characterize subsistence patterns of the affected communities. The FEIS should describe and analyze the total subsistence patterns of each affected community. The Forest Service needs to avoid limiting discussions to the project area because, at the same time, there are other timber sales in progress which may affect these same communities.
3. Present and future harvest demand for significant wildlife species affected by timber harvest need to be more clearly represented. ADF&G endorses the model of harvest demand articulated on p. 4-41, which forecasts an 18 percent per decade increase in demand through 2010 and 15 percent per decade increases through 2040. However, the way the discussion is organized it is difficult to understand how this model was applied or what the analysis reveals. We suggest that the FEIS include a table showing present and future harvestable supply versus demand in the project area by alternative for deer, goat, brown bear, black bear, marten and other important

species. Such a table would facilitate analysis and evaluation of impacts and complement Table 4-8 presented on page 4-16.

4. An issue is how much competition for wildlife will increase due to the effects of the new Campbell Timber Sale logging camp plus logging camps for future sales scheduled in the Bradfield Canal? That competition will temporarily increase due to the presence of the timber work force (page 4-43) is obvious: the question is how much? The harvest demand model discussed above is tied to regional population forecasts and does not take into account the sudden introduction of significant numbers of logging personnel into remote areas. For some time we have suggested that the Forest Service develop a site-specific model for estimating the demand on wildlife by logging camp personnel. As with the regional model, the site-specific model should be tied to population (the DEIS estimates a population of about 35 on page 4-43). It should not be assumed, however, that the percentage of remote logging community residents who hunt and fish is comparable to that of the general population. In fact, all evidence suggests that it is higher. Rather than speculate, the Forest Service should address this research question by examining hunting and fishing patterns of residents of existing logging camps. Mitigation and monitoring measures could include an analysis of the hunting and fishing patterns of Campbell logging camp personnel.

4. The impact of roads on subsistence should be more carefully evaluated. The statement that "Proposed roads in all action alternatives...could improve access to areas further inland...which previously have not been used for subsistence hunting" raises a significant concern. Subsistence hunters will be affected by such "improvements", because a) logging roads often lead to increased competition from local, non-local, and logging camp residents with potential reductions in individual hunter success and b) logging roads are a by-product of deer habitat reduction. The FEIS needs to evaluate the potential effects of road access at this site on subsistence based on public input and results of monitoring the effects on subsistence from other timber sales.

5. The DEIS does not present maps showing cumulative effects of logging in the Tongass National Forest. Although the project area is limited, Wrangell and other communities' subsistence patterns are also being affected by other timber sales throughout the Tongass. These impacts need to be clearly summarized so that cumulative effects on subsistence can be evaluated. The planning team should consult the Southeast Chichagof and Central Prince of Wales EISs for examples of how to represent project-specific and cumulative effects in tabular form. GIS mapped analyses (see Southeast Chichagof FEIS Appendix E) of deer supply (10 percent habitat capability) vs. demand (present and future harvest) for all Tongass WAAs should also be incorporated. This kind of spatial analysis is critical for the public to evaluate overall impacts on subsistence. A similar kind of analysis is needed for goat, bear, and marten.

Lorraine Marshall

June 25, 1993

As time permits, our Subsistence Division is willing to work with the planning team to improve the subsistence analysis before issuance of the FEIS.

MEMORANDUM

Wrangell
Ranger District

STATE OF ALASKA

JUN 25 1993 Department of Environmental Conservation

Mr.	Act.
Dist. Ranger	
B.M.A.	
T.M. Oper.	
O.R.A.	
F&W	
Planning	
Engineering	
Log Acct.	
Resource Clerk	

TO: Lorraine Marshall
Project Review Coordinator
OMB-DGC

DATE: June 21, 1993

THRU:

FILE NO: AK9205111-15J

FROM:

Jim Ferguson *JF*
Program Coordinator, Forest Practices
Southeast Regional Office

TELEPHONE NO: 465-5365

SUBJECT: Campbell Timber Sale DEIS

The Department of Environmental Conservation has reviewed the DEIS for the Campbell Timber Sale. The following comments are offered in order to ensure consistency with the ACMP and NEPA. A separate section discusses issues relevant to consistency with Section 319 of the Clean Water Act, as well as implementation of the ADEC/USFS Memorandum of Agreement.

Preliminary NEPA Comments

This EIS used an excellent approach to the analysis of the potential impacts of timber sales, as well as the identification of resource management needs in an area. This approach is soundly based upon the individual management needs of different types of ecological zones. ADEC also found the emphasis on selective harvesting to be refreshingly different. This area could certainly be a good test case for a small sale that is entirely composed of units that are selectively harvested and helicopter yarded.

However, ADEC believes that the no-action alternative should be seriously considered in this case. First, the area is small, producing a small volume of timber under relatively difficult operating conditions. If the sale is designed for purchase by a small purchaser/operator, then the reliance on helicopter logging seems inappropriate. Also, there is apparently little or no opportunity for future entries, making the area a poor choice for conversion to timber production. Finally, there is, in ADEC's opinion, a greater uncertainty about the impacts of the sale on fresh and marine water than is expressed in the DEIS. ADEC forest practices staff visited the site last summer and left with the opinion that there are serious concerns about these impacts.

The no-action alternative should be chosen, unless a more thorough analysis of the potential impacts to fresh and marine water quality demonstrates that the sale will have minimal impacts. In particular, the location of the log transfer facilities, as well as the excavation needed to approach these facilities, was not adequately discussed in the DEIS. Also, the proposed LTF sites do not meet some of the important criteria for LTF location recommended by the Timber Task Force.

Referring to the forest practices trip report for the ADEC inspection of the project area last year, Site 2 (Frank Creek) and Site 6 (Tom Creek) are proposed for construction. ADEC expressed little concern for Site 6, apart from potential impacts from the road building that will be needed to access the site. However, quoting from the report: "Site 2 does not appear to be workable, due to the presence of blue clay, and since a large amount of excavation would likely be necessary." The DEIS analysis is not sufficient to allay the concerns expressed in the inspection report, and does not adequately display projected road/LTF impacts.

If the no-action alternative is rejected, then Alternative D would seem to be preferable to Alternative F. Alternative D not only has lower potential water quality impacts, but has a greater projected net monetary return. The lower potential for water quality impacts primarily results from the absence of roads and LTFs. Alternative D also would provide an opportunity to explore the impacts (and the silviculture) of a timber sale that is designed entirely for selective harvest and helicopter yarding.

Preliminary ACMP Comments

As noted above, the information displayed about the proposed road/LTF facilities is insufficient for a meaningful analysis to be conducted of potential water quality impacts. This concern includes the approaches to the LTFs as well as the marine environment. The LTF sites will undergo an ACMP consistency review, as well as an ADEC 401 certification of the EPA 402 (or NPDES) permit. Further information will be required before these reviews can be completed.

Preliminary Section 319/MOA Comments

I. Appendix A, Unit and Road Cards:

1. Regarding the lake buffers—was the potential for windthrow of these buffers thoroughly explored? The buffers appear to be exposed to prevailing winds.

2. If an "action" alternative is chosen, please summarize and display, on a unit and road-specific basis, any changes to units and roads between the DEIS and the FEIS, along with the reasons for the changes (see, for example, the FEIS for the North and East Kuiu Timber Sale). Please include any site-specific BMPs or other mitigation measures that are prescribed before the issuance of the FEIS.

II. Appendix B, Monitoring:

The proposal for monitoring stream buffer effectiveness is inadequate. ADEC suggests that the ID Team contact Julianne Thompson, Area Hydrologist, to work on the proposal. The proposal does not state what is meant by buffer effectiveness. ADEC feels that tracking buffer blowdown, and the factors that contribute to buffers blowing down or remaining windfirm is a good idea, and is a worthwhile project. ADEC appreciates that the Forest Service wishes to conduct effectiveness monitoring. However, the Forest Service must be cautious to carefully define the project objectives, in order for the monitoring project to provide useful results. Also, ADEC suggests using the EPA guidelines: "Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska" (EPA/910/9-91-001) as a guide to definition and conduct of any monitoring studies that are proposed.

We appreciate the opportunity to comment.

cc: Dick Stokes, ADEC, Juneau
Lana Shea, ADF&G, Juneau
Don Cornelius, ADF&G, Petersburg
Chris Westwood, ADNR, Ketchikan
Abigail Kimbell, USFS, Petersburg
Meg Mitchell, USFS, Wrangell ✓
Wayne Elson, USEPA, Seattle

MEMORANDUM

Wrangell
Ranger District

JUL 02 '93

STATE OF ALASKA

To: Lorraine Marshall
Project Coordinator
Div. of Governmental
Coordination
Juneau

From: Don Cornelius
Area Habitat Biologist
Dept. of Fish and Game
Petersburg

Info.	Act.
Dist. Range	Date:
B.M.A.	
T.M. Open	File #:
O.R.A.	
F&W Phone:	
Planning	
Engineering	Subject:
Log Acct.	
Resource Clerk	

June 25, 1993

AK930524-33J

772-3801

Campbell Timber Sale
DEIS

The Alaska Department of Fish and Game has reviewed a Draft EIS for the Campbell Timber Sale. The Forest Service preferred alternative for the sale would cut about 15.9 mmbf of timber on the north side of Bradfield Canal between Marten Creek and Harding River. This is almost double the volume identified in the scoping document for this sale.

The information and recommendations contained herein are intended for use in the interagency development of a consolidated State response. We look forward to working with your office and other departments in developing that response.

This document does an excellent job in describing the existing resources and the majority of the impacts from cutting in the study area. We commend the Forest Service for this effort.

We are encouraged that methods of logging besides clearcutting are planned for this sale. The Forest Service will need to make sure the sale contract will enable the plans to be fully implemented. A rigorous and thorough monitoring program is also needed to evaluate if prescribed harvest techniques are effective in mitigating impacts to wildlife.

It appears this sale has the potential to reduce impacts on wildlife as compared to clearcutting. We note that leave trees or patch cuts are scheduled for a majority of the units and we encourage the Forest Service to maximize the number of larger trees retained in these units. If the Forest Service can follow the 12 inch and 16 inch DBH guidelines combined with retention of low value trees from a commercial perspective that have high value from a wildlife perspective, we believe this sale may provide an opportunity to harvest timber with less impact on fish and wildlife habitat.

Our major concerns regarding this sale relate to harvest of high value goat winter range and road construction through unstable soils.

Our comments are divided into the following sections: ACMP, NEPA and Subsistence.

ACMP

The Department will not complete a formal ACMP review of this sale until the FEIS is released. Thus, comments made under this section are intended for the use of the Forest Service in completing the FEIS for the Timber Sale.

The Alaska Forest Resources and Practices Act and Regulations constitute the ACMP standards for Forest Service Timber Sales. In completing our review we focus on FPA Section 41.17.060, items (b)(5), (c)(1), (c)(5) and (c)(7).

The Forest Service needs to consider:

Section (b)(5) states: "significant adverse effects of soil erosion and mass wasting on water quality and fish habitat shall be prevented or minimized."

Section (c)(1) states: "forest land shall be administered for the multiple use of the renewable and nonrenewable resources and for the sustained yield of the renewable resources of the land in the manner that best provides for the present needs and preserves the future options of the people of the state."

Section (c)(5) states: "there may not be significant impairment of the productivity of the land and water with respect to renewable resources."

Section (c)(7) states: "allowance shall be made for important fish and wildlife habitat".

1. One way the Forest Service assures the State these standards will be met is through the designation of "Retention" as provided under the current Tongass Land Management Plan. We are pleased the Forest Service has taken this step in designating retention but we are disappointed this was a unilateral effort rather than involving expertise of ADFG and USFWS biologists. We are also disturbed that different alternatives identify different areas for retention. Maximum benefits for wildlife are best achieved by selecting the most important wildlife habitat areas and utilizing them as a constant in all alternatives. The Forest Service can best meet this objective by selecting the areas for retention before units are even identified in the planning process.
2. Of particular concern is selection of units rather than designation of retention in high value goat winter range.

Mountain goats are a relatively uncommon, high profile species on the Tongass which are very susceptible to disturbance by man's activities...both consumptive and nonconsumptive. A limiting factor for this species is the availability of winter range. Forest wide, high value goat winter range comprises a very tiny portion of the CFL, yet it has considerable importance for the survival of this species. We do not see any justification for harvesting this rare habitat type which cannot be replaced for several hundred years. Long term negative impacts from this activity do not enable the Forest Service to meet the above described ACMP standards. Thus, in order for this Department to find this sale consistent with the ACMP, the following units or portions of units must be withdrawn:

- ✓ Unit 1 is one of two significant areas of high value goat winter range in high volume old growth on the south face of the ridge between Frank Creek and Marten Creek. The entire unit is identified as high value goat winter range.
 - ✓ Unit 2 is the other significant area of high value goat winter range in high volume old-growth on the south face of the ridge between Frank Creek and Marten Creek. This entire unit is high value goat winter range.
 - ✓ Portions of Units 3, 4, 5, 7 and 8 appear to be in high value goat winter range. Differences in the scale of maps which were provided restrict our ability to make definitive statements regarding which portions of the units are in this rare habitat. We request the Forest Service modify these units accordingly to eliminate the cutting of any high value goat winter range.
3. The DEIS identifies areas as containing deposits of blue clay and sand left over from the last glaciation, perhaps as long as 8000 years ago. Some of these areas are still unvegetated, presumably from chronic erosion. The Frank Creek Road will pass through this area and, at one point, a "bulkwork" is prescribed on the lower side of the road to prevent sloughing into a creek which appears to be an uncataloged anadromous fish stream. The level of detail and different scales of the maps precludes our confirming the proximity of this site to anadromous fish habitat.

Whether the stream is a tributary to anadromous fish habitat or anadromous fish habitat itself, we are concerned with the potential for chronic erosion from this disturbance. In our experience, once sand is disturbed, it is extremely difficult and expensive to control chronic erosion at that site. We will need additional information to address this issue in our review of the FEIS.

4. It also appears that several units within drainages of anadromous fish habitat are located in areas where soils are comprised of sand or blue clay. The use of helicopter logging techniques should enable the Forest Service to prevent soil disturbance in these areas provided appropriate standards are adopted for these units. Units within drainages of anadromous fish streams where sand/blue clay deposits appear to be located include units 9 and 10, and potentially, small portions of units 19 and 20. Again, this discussion is hampered by review of maps drawn to different scales. We request the Forest Service address this issue in greater detail in the FEIS.
5. We note that a log transfer facility is proposed for this sale to the east of Frank Creek. It is our understanding that, to date, resource agencies have not completed the needed habitat surveys in order to assess habitat values at this site. This portion of the project will require a COE Permit and completion of a separate coordinated ACMP review. It is always possible that this site will be rejected because of resource conflicts.

Similarly, to date, no site has been identified for the transfer of timber from the western portion of the sale area. This site will also need to be identified and approved prior to completion of the sale.

NEPA

1. We note that none of the units appear to be located in volume class 4 timber stands. Aside from proportionality considerations, the use of helicopter logging techniques could make this a viable method of harvest in low volume stands with reduced effects on wildlife. This technique has been used to harvest scattered high value trees in low volume stands on private lands in southeast. This may necessitate selection of some fairly large units which appear excessive on maps, but where selective harvest of a comparatively small number of trees could minimize resource impacts. We urge the Forest Service to consider this option to replace units in high value goat, and deer winter range or brown bear habitat.

Similarly, in all units, we urge the Forest Service to leave larger DBH trees (above the DBH size threshold established for the units) that have high value for wildlife yet low value as timber.
2. On page 1-8, in the last paragraph the Forest Service states that younger age class forests provide "vegetative diversity [and] forage for wildlife". In actuality, second-growth forests have less vegetative diversity than old growth and

do not provide as much forage for wildlife. This statement needs to be changed in the FEIS.

3. On page 2-21 the Forest Service needs to avoid calling retention of timber in the Harding River drainage mitigation for the Campbell sale. While we do not disagree that TLMP designation of VCUs as LUD II areas will benefit wildlife over broader areas, TLMP identifies retention factors in each VCU to provide for the needs of wildlife within each VCU.
4. We concur with the other mitigation measures for wildlife: avoiding timber harvest in beach or estuary fringes, the closure of all roads, the timing restrictions on harvesting, helicopter guidelines, and the use of a floating logging camp.
5. In Table 4-8, page 4-16, we request the FEIS include not only the percentage of remaining habitat capability, but also the numbers of animals estimated by the Habitat Capability Models. While this will not enable the Forest Service to predict the actual populations of species in the sale area, it will enable us to assess relative impacts from a sale in the Campbell area compared with other sales scheduled in the Stikine Area. Knowing if there is habitat capability for 500 bears or 5 bears in the study area will help us assess the significance of the loss of habitat capability, both in the sale area, and as Forest-wide cumulative impacts. While we recognize the models were never intended to predict actual populations at any given time, they do give the best current estimate of the numbers the habitat could support over the long term.

We have seen a recent trend in Stikine Area NEPA analyses to disavow the outputs of these models. We expect the models will be modified as techniques are developed to refine their use or new knowledge on species' habitat requirements is gained. However, at present, they provide the best current estimate of average long-term population ceilings for MIS on the Tongass. They were accepted for use in the TLMP Revision and, thus, we see no reason why they should not be used in project level analyses.
6. As we have indicated for other environmental documents we believe the intent of TLMP was to make retention a permanent allocation. Retention that is not permanent, robs the timber sale "planning" process of validity in predicting cumulative effects on wildlife. While this document only designates retention for the life of the sale, we were pleased to see the Forest Service at least indicates it should provide guidance to future planners.

7. We compliment the ID team for including the discussion and map on forest fragmentation. However, the map (figure 4-2) is hard to read at the scale presented. Proposed harvest units would stand out better on a colored map.
8. On page 4-42, the use of the 5.7 percent harvest rate for brown bears from Miller and Miller (1990) may be inappropriate in this case. As indicated in the DEIS, the Millers' rate is contingent on optimum conditions for bears...excellent habitat, high reproductive rates, and low natural mortality. Because we know very little about the Campbell Timber Sale bear population dynamics and a thorough assessment of habitat quality has not been done, a more conservative harvest rate should be assumed. We recommend use of the same sustainable harvest rate for brown bears as used in the TLMP revision...4 percent. For the same reason, the harvest rate for black bears in the DEIS may be too high. We recommend using the conservative rate of 7 percent sustainable annual harvest that is used in the TLMP revision.
9. On page 4-42, the final paragraph on brown bear abundance and distribution makes the assumption that because "most of the forest will be maintained in an old growth condition" brown bear distribution will not be significantly affected by logging. We are concerned about the possible effects of human disturbance and habitat loss on bear behavior during and possibly after logging. Six units...9, 10, 11, 12, 14, and 15 appear to harvest high value brown bear habitat along Frank's Creek (differing scales of maps hamper this analysis). This, combined with long term effects of the physical presence of a road into this area suggest it is reasonable to expect localized changes in distribution and/or abundance may occur.
10. We understand that the TIMCLU soils database is the inventory database used for the habitat capability models and harvest by timber volume class calculations. Other areas of the Tongass which use the TIMTYP database. For site-specific information the TIMTYP database has been shown to agree with field exams less than 50% of the time. We are unaware of a study on the reliability of the TIMCLU database for site-specific application. We do not favor one database over the other, but if the limitations of databases used for wildlife analyses are presented in NEPA documents, those used for timber analyses should also be included.
11. The DEIS contains a good selection of maps. Unfortunately, they are presented in two different scales. It was extremely difficult to compare wildlife habitat maps with those of the alternatives or the ecological zones. Also, it would facilitate overlaying maps of different resources if

maps had no text or other printing on the reverse side.

Subsistence

Because the Campbell Timber Sale affects a small area which in recent years has not been heavily used for subsistence harvesting of fish and wildlife, our comments are limited. Overall, the planning team appears to have made good use of mapped and other analytical data available from the Division of Subsistence and other sources.

Our Subsistence Division has recently been working closely with the Forest Service to develop a more comprehensive model for evaluating the site-specific and cumulative impacts that individual timber sales may pose to subsistence harvesters of fish and wildlife in Southeast Alaska. This model was employed in the DEIS and FEIS subsistence analysis for the Southeast Chichagof Timber Sale. We found that the Southeast Chichagof documents did a very good job of depicting subsistence uses and effects of logging on these uses. We had hoped that this plan would set a standard for analyses of this type. Although the Campbell DEIS does incorporate some features of this improved method of doing subsistence analyses, this document is not as thorough as the SE Chichagof document in several critical areas. These include:

1. Subsistence is not identified as a key issue in the planning process. ANILCA is quite clear with respect to the priority of subsistence over other consumptive uses of the forest, yet even under Issue 8 (page 1-12) "The effects of the proposal on cultural resources and other social values in and around the study area", subsistence uses and values are not explicitly mentioned. This treatment implies that subsistence uses are not qualitatively different than other harvest or recreational use of the area. Failure to separate subsistence from other issues can lead to a rather convoluted discussion of impacts, as on page 4-40, for example, where visual and scenic impacts are treated in the same paragraph as subsistence 810 determinations.
2. The DEIS does not adequately characterize subsistence patterns of the affected communities. The FEIS should describe and analyze the total subsistence patterns of each affected community. The Forest Service needs to avoid limiting discussions to the project area because, at the same time, there are other timber sales in progress which may affect these same communities.
3. Present and future harvest demand for significant wildlife species affected by timber harvest need to be more clearly represented. ADF&G endorses the model of harvest demand articulated on p. 4-41, which forecasts an 18 percent

per decade increase in demand through 2010 and 15 percent per decade increases through 2040. However, the way the discussion is organized it is difficult to understand how this model was applied or what the analysis reveals. We suggest that the FEIS include a table showing present and future harvestable supply versus demand in the project area by alternative for deer, goat, brown bear, black bear, marten and other important species. Such a table would facilitate analysis and evaluation of impacts and complement Table 4-8 presented on page 4-16.

4. An issue is how much competition for wildlife will increase due to the effects of the new Campbell Timber Sale logging camp plus logging camps for future sales scheduled in the Bradfield Canal? That competition will temporarily increase due to the presence of the timber work force (page 4-43) is obvious: the question is how much? The harvest demand model discussed above is tied to regional population forecasts and does not take into account the sudden introduction of significant numbers of logging personnel into remote areas. For some time we have suggested that the Forest Service develop a site-specific model for estimating the demand on wildlife by logging camp personnel. As with the regional model, the site-specific model should be tied to population (the DEIS estimates a population of about 35 on page 4-43). It should not be assumed, however, that the percentage of remote logging community residents who hunt and fish is comparable to that of the general population. In fact, all evidence suggests that it is higher. Rather than speculate, the Forest Service should address this research question by examining hunting and fishing patterns of residents of existing logging camps. Mitigation and monitoring measures could include an analysis of the hunting and fishing patterns of Campbell logging camp personnel.

4. The impact of roads on subsistence should be more carefully evaluated. The statement that "Proposed roads in all action alternatives...could improve access to areas further inland...which previously have not been used for subsistence hunting" raises a significant concern. Subsistence hunters will be affected by such "improvements", because a) logging roads often lead to increased competition from local, non-local, and logging camp residents with potential reductions in individual hunter success and b) logging roads are a by-product of deer habitat reduction. The FEIS needs to evaluate the potential effects of road access at this site on subsistence based on public input and results of monitoring the effects on subsistence from other timber sales.

5. The DEIS does not present maps showing cumulative effects of logging in the Tongass National Forest. Although the

project area is limited, Wrangell and other communities' subsistence patterns are also being affected by other timber sales throughout the Tongass. These impacts need to be clearly summarized so that cumulative effects on subsistence can be evaluated. The planning team should consult the Southeast Chichagof and Central Prince of Wales EISs for examples of how to represent project-specific and cumulative effects in tabular form. GIS mapped analyses (see Southeast Chichagof FEIS Appendix E) of deer supply (10 percent habitat capability) vs. demand (present and future harvest) for all Tongass WAAs should also be incorporated. This kind of spatial analysis is critical for the public to evaluate overall impacts on subsistence. A similar kind of analysis is needed for goat, bear, and marten.

As time permits, our Subsistence Division is willing to work with the planning team to improve the subsistence analysis before issuance of the FEIS.

Thank you for the opportunity to comment.

cc: L. Shea, ADFG, Juneau J. Ferguson, ADEC, Juneau
 T. Paul, ADFG, Juneau B. Palmer, ADNR, Juneau
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Reply To: 1950

Date: September 29, 1993

Lorraine Marshall
State of Alaska
Division of Governmental Coordination
PO Box 110030
Juneau, Alaska 99811

Dear Ms. Marshall:

I would like to respond to the State of Alaska's consolidated comments concerning the proposed Campbell Timber Sale Draft Environmental Impact Statement. The deadline for comment on the draft was July 14, 1993. The State's consolidated response was faxed to our office on August 5, 1993. However, both the Department of Environmental Conservation (DEC) and the Department of Fish and Game had forwarded copies of their DGC comments to our office prior to the deadline. We appreciate the State's response to our projects and therefore will respond to DEC and ADF&G's comments through your office. The format of my response will follow the outline of the consolidated response dated August 5th. The State's consolidated response and the letters from DEC and ADF&G will be published in the Final Environmental Impact Statement as will this response.

NEPA COMMENTS

Wildlife

Thank you for your concurrence and your assistance in establishing the mitigation measures for wildlife. The discussion with ADF&G and the Fish and Wildlife Service were helpful in the formation of such guidelines early in the NEPA process. We would like to continue to foster such exchanges on future projects. For your information, these guidelines have been refined since the DEIS based on further public and agency comments (see FEIS, Mitigation Measures in Chapter 2).

Wildlife/Harvest Volumes

Some units have been proposed in volume class 4 (8-20 MBF/acre) timber stands under all alternatives except for the "no action." Volume 4 stands are particularly common in the Tom Creek area, therefore Alternative E (which

proposes the only harvest in the Tom Creek watershed) has several volume class 4 units proposed for cable logging. The other alternatives in the DEIS concentrated harvest along the West Face and the Frank Creek watershed in order to avoid impacts to aesthetic, wildlife and fishery values and poor harvest economics in Tom Creek. The majority of the suitable-accessible area on the West Face and in the Frank Creek watershed is composed of volume class 5 timber stands. Therefore, naturally our proposed unit selection calls for the harvest of predominantly volume class 5 stands. There is one large area of volume class 4 stands located along the West Face which is both suitable and accessible. However, a field inventory revealed that this area was composed of predominantly defective, low value timber and averaged approximately 9 MBF/acre, barely within the classification of volume class 4, productive forest land. Because this area would have to be logged with a helicopter, it could only be viable under a much more inflated timber market than today. Helicopter logging is a very expensive operation, the value of the scattered, higher value trees in this particular volume 4 stand does not justify the costs associated with this yarding method. In the FEIS we have shown the location of these marginally economical areas which are suitable and accessible, but are not economical to log with a helicopter under present or even predicted economic conditions (See FEIS, Figure 3-10).

We concur with your recommendations to leave larger trees within harvest units for increased above ground and below ground structural diversity and wildlife habitat. Clumps of large, merchantable but low commercial value leave trees have been designated to be left in larger units (#4, #5, #6, #7) and streamside units (#12, #14, #15) in all alternatives. These clumps of larger leave trees were designated in areas which would not pose a safety threat to loggers or an obstruction to helicopter yarding operations. As suggested by ADF&G, we will emphasize and encourage the operator to leave as many unmerchantable trees as possible which do not conflict with Occupational Safety and Health Administration (OSHA) standards. We expect that many of these trees will be larger than the diameter limit threshold established for the units.

Wildlife Retention

We disagree that the designation of areas to be managed for old growth habitat characteristics should or could not vary among alternatives for this particular project area. There are as many alternatives for the designation of areas to be retained as there are alternatives for areas to harvest. Under ecosystem management, the Interdisciplinary Team felt that it was equally important to examine "what is left" under each alternative theme as "what is taken." This in no way means that we did not select important wildlife habitat areas to be retained under all alternatives. Instead, it means that when selecting areas to leave for wildlife there is room for discretion depending on which key species or geographically important areas we wish to emphasize under a particular alternative.

For example, most of the saltwater influence zone was selected to be retained under all alternatives. This is because this zone is very important to a variety of species. However, additional acres of old growth were also

designated in upland areas within the guidelines established by the forest plan. Under Alternative B, any discretionary acres were designated within high value goat habitat since this was the "theme" of this alternative, while under Alternative D, any discretionary acres were predominantly located up Frank Creek in areas of high value bear and goose habitat. Similarly, under Alternative F, discretionary acres were placed within the Tom Creek watershed in order to emphasize the importance of this area for many species including bears.

I feel that it is equally important for me to understand the tradeoffs for old growth areas to be retained and harvested and the potential ramifications of both on the significant issues. As part of this project planning effort, ADF&G and the Forest Service had several meetings and one joint field trip where alternatives for this project were discussed. I am highly supportive of such interactions because I believe they result in better alternatives and decisions. In the future, I encourage ADF&G to discuss this issue with us during such joint meetings.

Wildlife Fragmentation

Thank you, we learned a great deal about how the project area "fit into" the surrounding landscape from the fragmentation analysis. However, we concur that Figure 4-2 is difficult to read. Color maps are very expensive and we felt we could enhance the "readability" of this map by changing the shades of gray used in the FEIS.

Timber Inventory Database

The Interdisciplinary Team felt that the TIMCLU data base was more accurate for the project area and more amenable to an ecosystem approach because it is based on a soil inventory. Field reconnaissance and cruise plot data gathered in 1984 were used to make some changes in volume class data in some suitable and accessible areas. Streams and other data within the GIS were also updated based on field reconnaissance. A full field inventory would be necessary to quantitatively determine the exact level of accuracy of the TIMCLU data base for this project. Such an inventory was not conducted due to time and funding limitations. Therefore we can only describe the field reconnaissance process and methods we went through to update the timber data base (See FEIS, Timber Harvest and Production, Chapter 3).

Method of Impact Analysis

Thank you, I agree that this area will be good test case for the evaluation of selective harvest methods. The selected alternative is entirely composed of units that are selectively harvested by helicopter, as were all the Alternatives except Alternative E.

Consideration of Other Alternatives

I did consider the "no action" alternative seriously for this project but disagree with DEC's rationale for selecting it. Although this sale was planned

for the independent, short-term market it was not planned specifically for purchase by a small operator. DEC is correct in stating that it would be difficult for a small purchaser to log the sale given the emphasis on helicopter yarding which would likely require they subcontract with a helicopter logging operation. DEC is also correct in stating that the area has little potential for future entries within the rotation. However, none of these factors makes the area unsuitable for conversion of some of the project area to some form of timber production. As DEC points out, this area does make a good test case for "unconventional" methods of timber harvest and a new way of thinking about our conventional models of "timber production." We face entry into many areas with equally difficult terrain and circumstances as the Campbell project area. At the same time, we face a tremendous challenge to supply a growing national demand for jobs and wood fiber while at the same time managing ecosystems for aesthetic, wildlife and fishery values. I believe we can meet that challenge in the Campbell project area and perhaps learn something to apply to other equally difficult landscapes to manage in the process. For these reasons, I chose an "action" alternative.

However, in formulating Alternative P, based on comments on the Draft Campbell EIS (including the State's comments), I did combine the best characteristics of Alternative F and Alternative D. Like Alternative D, Alternative P has lower potential water quality and wildlife impacts due to the absence of roads and elimination of the Frank Creek Log Transfer site. In order to make this decision and to address the concerns about the lack of information in the DEIS concerning the West Face and Frank Creek Log Transfer sites, we requested that the Fish and Wildlife Service dive these sites. Information gained from these dives is now displayed in the FEIS and the full dive report is provided in Appendix E.

Page Specific Comments

Page 1-8. We agree that within a second growth stand, vegetative diversity is generally reduced. However, this "desired future condition" refers to the entire Freshwater Influence Zone, not individual stands. Thus from a landscape perspective, the second growth stands established by timber harvest create more vegetative diversity (horizontal diversity) than a continuous old growth forest. Forage for wildlife is maximized during early years following harvest (when shrub and berry production increases), before crown closure. Admittedly the degree of use of this available forage by wildlife is not well established but the vegetative response is well known. We agree that the sentence in the DEIS may not adequately explain our rationale, therefore we have modified the statement in the FEIS.

Page 2-21. We did not state the timber in Harding River should function as "retention" for the Campbell Timber sale on this page or in any other place in the DEIS that we could find. Old growth blocks are designated to be retained within the Campbell VCU under each alternative. The only statement regarding the Harding River on page 2-21 was inserted to disclose that none of the alternatives harvest in the watershed of the Harding River which is proposed for inclusion within the Wild and Scenic River system. In addition, the watershed of

this river is protected by all action alternatives. We prefer to keep this statement in the FEIS because protection of the scenic qualities of this river was a concern brought up during public scoping for the Campbell Timber Sale. The mitigation measures for wildlife habitats were listed on the following page in the DEIS and the designation of old growth areas to be retained in the VCU is mentioned as a mitigation measure.

Page 4-16. Table 4-8 now shows the estimated numbers of animals predicted by the models in the FEIS.

The Stikine Area does not disavow Habitat Capability Models. Disclosing the possible limitations of the methods used for analysis is intended to enhance credibility and prevent misinterpretation of their results. These models remain the best current method for comparing the effects of the alternatives. For further discussion of this issue, I refer ADF&G to my letter to Don Cornelius dated June 28, 1993.

Page 4-42. We concur, the 4% and 7% sustainable harvest rate was used for the subsistence analysis in the FEIS.

Also on page 4-42. Impacts to brown bear from timber sale activities include habitat alteration, increased hunting and recreation access for humans due to roads and increased hunting and non-hunting kills as a direct result of logging activities. The habitat capability model predicts high value bear habitat in these units mainly due to their proximity to Frank Creek, an anadromous fish stream. Mitigation measures (for example, stream buffers) to maintain the fish run presumably will also maintain the use of these streams by bears. Thus the main habitat component of concern is the fish and stream, not the vegetation. It was assumed in the subsistence analysis, that the units would not prevent bears from using the stream or cause a bear to avoid such areas since bears tend to use a variety of habitats (habitat generalists) across the landscape. Of greater concern for bears is the access for hunters provided by roads. Closing the roads to motorized use after the sale would mitigate much of the concerns for increased hunting pressure by keeping hunting accessibility close to existing levels. We concur that there may be some disruption to bears during the 1-2 seasons of harvest activity. Hunting pressure during logging can be mitigated by a joint hunting closure of the area by ADF&G and the Federal Subsistence Board. In addition, the relatively small changes in estimated habitat capability derived by the model would suggest that the project would not have much affect on bear abundance. For the above reasons, we do not believe that project activities will significantly affect brown bear distribution and abundance from a VCU or WAA perspective. The selected alternative for this project even further reduces the potential effects on brown bears by dropping Units #11 and #14 and by dropping the Frank Creek road and LTF. Although I have no direct control over the hunting regulations, I will make a recommendation to the federal subsistence board that the harvest area be closed to brown bear hunting during logging activity. A joint action by the State of Alaska would also be required to fully close the area to hunting during the logging operation.

Maps

We will be furnishing maps of the habitat capability information at the same scale as the alternative maps in Appendix F of the FEIS.

SECTION 319 CLEAN WATER ACT/USFS-DEC MOA COMMENTS

Appendix A, Unit and Road Cards

There are no TTRA buffers separating the lake from Units #34 and #35. No reference to buffers is included in the prescription, nor is there a map symbol depicted. The areas between these units and the lake are forested muskeg containing no merchantable timber; thus, these are non-TTRA buffers by default. Forested muskeg has been shown to have very low windthrow susceptibility.

A table summarizing the changes in units and roads between DEIS and FEIS has been provided in the FEIS (See FEIS, Table 2-14).

Appendix B, Monitoring

A more detailed buffer monitoring plan has been included and the discussion expanded.

PRELIMINARY ACMP COMMENTS

Retention

As part of the decision on this project I will designate areas to be managed for old growth habitat in all alternatives including the selected alternative. The selected alternative calls for the designation of 169 acres of high value goat habitat as areas to be managed for old growth. There are also 220 acres of suitable forest land and 780 acres of unsuitable forest land in high value goat habitat that will not be harvested.

Goat Winter Range

Units #1, #2 and the west half of unit #3 were dropped in the formulation of the selected alternative after consultation with our own biologists and with ADF&G and the Fish and Wildlife Service by phone after comments were received on the DEIS. Although I understand that ADF&G believes that an optimal scenario would avoid harvest in all areas of high value goat winter range, I believe that this strategy adequately responds to the need to protect this type of habitat within the WAA (the landscape scale) and the VCU (the project scale). There is a total of 3822 acres of high value goat winter range in the WAA and 1092 acres in the VCU. Some of the best of this habitat is adjacent to saltwater where maritime influences seem to reduce snowloads over similar interior areas. There are 1450 acres of saltwater facing high value goat winter range in the WAA and 670 acres in the VCU. The largest contiguous block of this habitat in the WAA is 660 acres and occurs on the West Face and the adjacent Marten Creek VCU. The selected alternative would harvest 19 acres (3%) from the fringes of this block, leaving the rest intact and minimizing any potential problems with utilization of the rest of the block. The selected alternative would harvest a total of 95

acres of high value goat winter range, leaving 97% of this habitat in the WAA and 91% in the VCU. Most of this remaining habitat is not scheduled for harvest either in the current Forest Plan or the preferred alternative in the Revision.

Alternative B was provided in the range of alternatives in order to consider an alternative that did not harvest any high value goat winter range on the West Face. Also, Alternative G considered an alternative to harvest within goat winter range using group selection. I did not select either of these alternatives and chose to proceed with the above strategy largely due to harvest economics, the uncertainty that group selection methods would be successful in retaining goat habitat and my belief (based on analysis in the FEIS) that the goat population will adequately be provided for while meeting the purpose and need for this project and the desired future condition of the area as described by the Forest Plan.

Erosion

The Frank Creek road has been dropped in the selected alternative. However, the road design for other alternatives did avoid sand and blue clay areas whenever possible. The road would only fill on top of limited deposits of blue clay. There were no planned cuts into sand banks. The bulkwork is located adjacent to a tributary of the small Class I stream just east of Frank Creek. The bulkwork would be approximately 300 feet in length and is located on till material with a 60% sideslope. These plans were reviewed by engineers, a soil scientist and a hydrologist.

Soil Disturbance

Units #9, #10, #26, #29 and portions of units #15 and #28 are located on soils developed in stratified glacio-lacustrine deposits as outlined in Figure 3-2. These units have been designed to avoid adverse impacts by application of practices such as helicopter logging for full suspension of logs. Especially hazardous areas on these soil types have been determined to be unsuitable forest land and are not considered for management by this project. These areas were reviewed in the field by a soil scientist. The unit cards contain more specific information in the FEIS (See FEIS, Appendix A, Unit and Road Cards).

Activities Requiring Other State and Federal Authorizations

The Frank Creek Log Transfer Site does not meet all the ATTF criteria for a transfer site. The Frank Creek LTF was important to the potential development of a road which would allow more timber to be accessed further up the drainage by helicopter. Without a road, some stands of timber become inaccessible due to the fact that long flight distances preclude economic harvest. A habitat survey and dive was performed near the proposed Frank Creek LTF site in 1982 and again in 1993 by the Fish and Wildlife Service upon our request. Although there are mitigating circumstances (rehabilitation, low volume, one time use, etc.), this site was not recommended for development. For this reason, the selected alternative (Alternative P) does not develop this LTF site and the associated road system.

The West Face Log Transfer Site was identified at the time of the DEIS but was inadvertently left off the map. This site was also investigated by divers in 1993 and subsequent recommendations appear favorable for the development of a LTF at this site. New analysis and information is included in the FEIS. The proposed West Face Log Transfer Site is sited on a colluvial/alluvial fan formed mostly of cobble, rubble, and boulders with gravel comprising a minor component. There are two streams on the northeast side of the fan, one ephemeral and one perennial. Although the primary hillslope delivery channel is still quite active, creating an ephemeral stream condition, there is no evidence that its location has changed in the recent past. Gradient of this stream is steep in the lower 700-foot reach, ranging from 4.5% in the first 100 feet to 15% in the next 600 feet. Instream wood has been pushed high against the streambanks or carried out to sea as there is virtually no wood in the middle of the channel to create pools. The perennial stream has a gentle enough gradient in the lower 300-foot reach to support fish. Two juvenile coho and two trout fry were electroshocked in this reach, all within the first 100 feet from saltwater. The intertidal area is comprised of cobble and rubble, and according to dive reports, the subtidal area falls off steeply to deep water. No intertidal spawning by pink and chum salmon has been observed and, given the size of the substrate, it is very doubtful it occurs. There are no mudflats, sandflats, or grassflats to create an estuarine condition. The transition from freshwater to saltwater is a very abrupt one. Although the LTF does not meet the S1 guideline (Proximity to Rearing and Spawning Areas), we do not feel that this site possesses the estuarine features this guideline was developed to protect. Logs in bag booms or log rafts would provide more cover for feeding smolts than now exists. Upstream spawners such as coho do not require the protection that intertidal spawners such as pink and chum do.

Road cards have also been improved for the other alternatives. No roads are planned under the selected alternative.

GENERAL ADVISORIES

We appreciate the compliments from ADF&G and DEC regarding the analysis and alternatives to clearcutting which are being proposed for the Campbell Timber Sale. We continue to learn in our effort to manage ecosystems. I also appreciate the cooperation of ADF&G and DEC personnel in field visits and several meetings during the planning process for this sale. Your cooperation is important to the evolution and implementation of ecosystem management.

ADF&G SUBSISTENCE COMMENTS

We concur with ADF&G that the Campbell Timber Sale affects a small area that has not been heavily used for subsistence. In addition, the selected alternative has several mitigation measures which further reduce any potential effects on subsistence uses.

(1 & 2) Under Council of Environmental Quality (CEQ) regulations for the execution of the National Environmental Policy Act (NEPA), we are asked to keep our discussion within NEPA documents limited to the significant issues on the

project. In conducting public scoping and analysis the subsistence resources at this particular project area was not brought up as a major issue of public interest. Therefore the text of the FEIS contains a summary of the full analysis. ADF&G's concerns about documentation did prompt us to include more maps and tables from the full analysis in the Appendix of the FEIS to support the summary in Chapters 3 and 4 (See FEIS, Appendix D, TRUCS Maps). The full analysis is located in the planning file for this project and will be sent to ADF&G and the Fish and Wildlife Service with their copy of the FEIS. The analysis contains more information on how communities were chosen for analysis, better background information on the communities and more community level effects analysis.

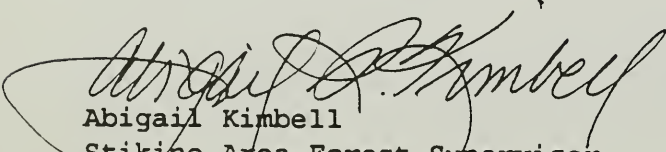
Also, although we maintain that subsistence was not a key issue for this project or within this analysis (as defined by NEPA and CEQ), we do agree that Issue 8 should explicitly mention subsistence as one of several social values so the reader knows where the subsistence information is located. This change has been made in the FEIS.

(3) The table ADF&G suggests has been added to Appendix D in the FEIS.

(4) Road access can lead to increased competition for subsistence resources. However, this is a much greater concern if the new road connects the sale area to a previously unconnected town or ferry terminal. This would not be the case for any of the roaded alternatives. In fact, one of the reasons the area is not used heavily for subsistence is because it is located a substantial travel distance away from any community. Additionally, by closing the roads upon completion of the sale, we would expect to reduce the numbers of new hunters that might be attracted to the area. Thus competition by logging camp residents and motorized hunters should be limited to the approximately two years the sale is being logged. Many of the loggers are in fact, subsistence hunters. As part of the mitigation measures in the FEIS I will recommend that the State and Federal Subsistence Board close the area affected by logging to brown bear hunting while the sale is being logged. I therefore do not concur that this sale would be a good sale to monitor the use of resources by logging personnel or develop a model of such use. In addition, there are no roads associated with the selected alternative.

(5) The subsistence analysis in the FEIS now includes the maps which were first produced by Thornton. This analysis also includes a table showing areas Wrangell residents use to hunt deer and timber sale plans for those areas (See FEIS, Appendix D). However, it is beyond the scope of this project level analysis to analyze the effects of these sales on subsistence hunting by Wrangell residents.

Again, I would like to thank ADF&G and ADEC for their timely review and response to the DEIS and cooperation in the planning of the Campbell Timber Sale project.



Abigail Kimbell
Stikine Area Forest Supervisor

Alaska Natural Heritage Program

University of Alaska Anchorage • The Nature Conservancy



July 5, 1993

Meg Mitchell
Stikine Area
Tongass National Forest
P.O. Box 51
Wrangell, AK 99929

Dear Ms. Mitchell:

I have received and reviewed portions of the Draft EIS for the Campbell Timber Sale, Stikine Area, Tongass National Forest. As botanist with the AK Natural Heritage Program I was specifically concerned with the section on Threatened, Endangered and Sensitive Species. Although it is true that no listed or candidate species are known from this area, it should be stressed that the flora of this specific area has not been well explored. There is at least one Category 2 candidate species (Carex lenticularis var. dolia) that is known from the general area and which could occur in the Timber Sale area; a site survey would be necessary to determine if it is in fact present. In addition, although there currently is no Sensitive Plant Species list for the Tongass Forest, a number of species have been suggested for inclusion on such a list, several of which may possibly occur in the Sale Area.

Thank you for the opportunity to comment on the Draft EIS. If you have any questions regarding these comments, please contact us at the above address.

Sincerely,



for Rob Lipkin

United States
Department of
Agriculture

Forest
Service

Alaska Region

Tongass National Forest
Wrangell Ranger District
P.O. Box 51
Wrangell, AK 99929

Reply To: 1950

Date: September 29, 1993

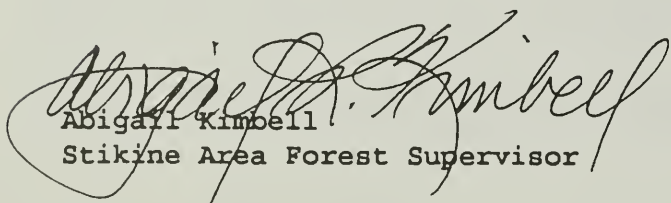
Rob Lipkin
Alaska Natural Heritage Program
The Nature Conservancy
707 A Street, Suite 208
Anchorage, AK 99501

Dear Mr. Lipkin

We are aware that there are two plants now listed as Category 2 candidate species that may occur in our area. In addition to Carex lenticularis var. dolia which you mentioned, Calimagrostis crassiglumis may also occur in our area. Both occur in wet meadows and may be found on grassy beaches which have some potential to be impacted with this sale from log transfer facility development.

Prior to this summer we did not have anyone on our staff who could identify either of these two species and neither occurs in Holten's Flora of Alaska. This summer Mary Stensvold, our Regional Botanist, trained several district employees in the identification of these two species as well as several other rare plants that may be found in our area. In late July, one of your botanists, Mike Duffy, accompanied Susan Wise-Eagle, Wrangell District Fish and Wildlife Staff in a botanical survey of sites in the Campbell study area where the two candidate species were likely to occur and where management activities were also proposed to occur in the various alternatives. Neither species was found at any of these sites.

Since neither of these species is listed as either threatened or endangered, Biological Assessments with concurrence by the US Fish and Wildlife Service are not required and will not be prepared. There will be a short discussion of these two species in the FEIS.


Abigail Kimbell
Stikine Area Forest Supervisor



United States Department of the Interior

OFFICE OF THE SECRETARY

Office of Environmental Affairs
1689 C Street, Room 119
Anchorage, Alaska 99501-5126

TAKE
PRIDE IN
AMERICA

ER #93/0441

July 8, 1993

Ms. Abigail Kimbell, Forest Supervisor
Alaska Region
U.S.D.A. Forest Service
Tongass National Forest
P.O. Box 309
Petersburg, Alaska 99833

Dear Ms. Kimbell:

In response to your May 20, 1993 request, we have reviewed the Draft Environmental Impact Statement (DEIS) for the proposed Tongass National Forest, Campbell Timber Sale. We offer the following comments for your consideration.

GENERAL COMMENTS

It is our understanding that interagency preliminary planning for this proposed project has been very good. We commend the Team Leader for bringing other agencies into the planning process and considering their concerns.

We support your efforts for investigating alternatives to clearcutting, as shown in this document. Selection of an alternative to clearcutting (multi-storied, multi-aged timber stands to maintain habitat diversity) will reduce the deleterious effects that practice has on wildlife populations in the Tongass National Forest.

An index in the back of the document would simplify review of the EIS by enabling the reader to refer quickly to topics of interest in the document. We suggest this be added to the document.

Alternatives D through G propose additional log transfer facilities at Tom Creek and West Face, but none of the maps show the proposed locations of these facilities. We suggest they be added to the map.

SPECIFIC COMMENTS

Chapter 1, page 9. We believe the DEIS should state what measures will be taken to reduce the effects of motorized traffic on wildlife in the Freshwater Influence Zone.

Chapter 2, page 16. The map for Alternative F shows a number 21, but there is no unit associated with the number.

Chapter 3, page 11, paragraph 3. Deposits of blue clay and sand occur in the Frank Creek and Tom Creek drainages. We recommend the EIS address the avoidance of these deposits when selecting road locations since their disturbance poses a threat to water quality, and may result in long-term erosion and sedimentation impacts on fishery resources.

Stikine Area

JUL 15 '93

✓	Forest Supv	
	P.I.D.	
✓	AC	
	Eng. Staff	
	F & WL Staff	
✓	Planning Staff	
	RI. Staff	
	S & W Staff	
	Timber Staff	
	Plan. Dist.	
✓	Wmct. Dist.	

Chapter 3, page 22, paragraph 3. The DEIS refers to other Value Comparison Units (VCU) surrounding the project area, but it is difficult to discern where these VCU's are without looking them up in other documents. We suggest the map on page 21 label all the VCU's mentioned in the DEIS.

Chapter 3, page 44. The acronym "HSI" should be defined and listed in the Glossary.

Chapter 3, page 49, paragraph 1. The fact that there were no responses to recorded goshawk calls does not signify an absence of nests. The March 1, 1993, draft "A Conservation Strategy for the Queen Charlotte Goshawk on the Tongass National Forest" written by Forest Service Biologist Cole Crocker-Bedford states that goshawk surveys frequently fail to locate nest sites.

At least 17 marbled murrelet tree nests have been found in Alaska. Two tree nests have been documented in southeast Alaska, including one found on Twelve Mile Arm in 1992 and another in Kelp Bay in 1984. Eggshell fragments found below trees on Prince of Wales Island are also indicative of tree nesting. All these nests have been associated with old growth trees. For more information on these shell fragments contact the Alaska Department of Fish and Game. Approximately eight murrelet ground nests have been documented in Alaska, although none of these were in southeast Alaska. While marbled murrelet nesting ecology remains little known, it is clear that nesting is strongly associated with mature timber habitat throughout the forested portion of their range, including southeast Alaska.

Chapter 3, page 50. Table 3-11 shows no hazardous soils in Frank Creek. During the August 12, 1992, interagency field investigation, deposits of blue clay were found along Frank Creek as stated on page 11 of the DEIS. Blue clay is an unstable soil when disturbed. Figure 3-3 shows moderate and high hazard soils along Frank Creek. We recommend Table 3-11 be modified to reflect the presence of these soils.

Chapter 3, page 54, Figure 3-18. The map incorrectly identifies stream 107-40-10390 as 107-40-10350.

Chapter 3, page 60. Figures 3-19 and 4-3 both depict goat winter range in the project areas, but they are not identical--the figures should be made consistent.

Chapter 4, page 2, paragraph 1. We recommend the DEIS provide documentation to support the assumption that Vancouver Canada geese are expected to nest farther up-stream along Tom and Frank Creeks where timber harvest will not occur.

Chapter 4, page 11. We recommend the October 21, 1985, "Log Transfer Facility Siting, Construction, Operation and Monitoring/Reporting Guidelines" be used when planning the location and operation of any log transfer facility (LTF). Siting of LTFs in estuarine areas should be avoided. Wood waste and other non-point source pollutants could negatively effect water quality and fish and wildlife habitats. Activities at logging camps, LTFs, and log storage sites will cause some species of migratory birds, such as shorebirds and sea ducks, and other wildlife to avoid these high value habitats. Turbidity and chronic pollutants can adversely affect salmon fry which rear in anadromous tributary streams and migrate through the bay. We believe the Final EIS should address the direct and cumulative adverse effects on fish and wildlife resources from construction and operation of the LTFs in bays, estuaries, and nearshore waters. In May 1982, the Fish and Wildlife Service conducted on-site LTF investigations in the project area and will be conducting similar investigations of the two LTF sites proposed in the DEIS in the near future. A report of the findings of these investigations will be provided to the Forest Service when it is completed.

We recommend the Final EIS include a mitigation plan to avoid and minimize adverse effects of the project on marine and estuarine areas. The mitigation plan should include best management practices to avoid and reduce the adverse effects of bark deposits and specific measures to mitigate for any unavoidable habitat losses resulting from construction and operation of the LTF and log storage sites.

Chapter 4, page 12, paragraph 4. Since the least adverse impacts to the marine environment result from direct barge loading of logs from shore, we suggest that this option be presented as an alternative to marine dumping of logs for all the LTF sites.

Chapter 4, page 17, paragraph 2. Marbled murrelet pre-breeding flight counts and intensive surveys during the breeding season (May 15 through August 15) should be conducted at the site, and results included in the interagency database and Final EIS.

It would be helpful for the Forest Service to develop a management plan for marbled murrelets that will ensure the maintenance of populations throughout the Tongass National Forest. Current programs are not adequate to protect marbled murrelet populations because of the difficulty in locating nests, and the questionable effectiveness of a 600-foot buffer zone around nests. At a minimum, increased efforts are needed to locate murrelet nests and study murrelet nesting ecology.

We suggest that the Forest Service work closely with the Marbled Murrelet Recovery Team, the Pacific Seabird Group and the Fish and Wildlife Service to develop and implement management measures that assure protection of marbled murrelets.

Based on habitat type, the probability that northern goshawks inhabit and/or utilize resources in the Campbell Timber Sale area is high. We recommend that the Final EIS address the need for conducting more goshawk surveys in the project area and in the surrounding VCUs during March through August prior to timber harvesting.

The DEIS stated that the Forest Service interim guidelines for goshawk management, dated August 18, 1992, will be implemented during the Campbell Timber Sale project. As we have repeatedly advised the Forest Service, these guidelines are not adequate based on current information on goshawks.

We are aware that goshawk management recommendations have evolved over time and continue to be amended as the information base on this species expands. Although all North American goshawk subspecies exhibit relatively consistent patterns of habitat use and other behavior, we recommend continued investigations of the northern goshawk in southeast Alaska, and prompt amendment of management guidelines as indicated by the findings. We also recommend that the Forest Service establish a monitoring program in cooperation with the Fish and Wildlife Service to evaluate the effects of these guidelines on goshawks and the long-term cumulative impacts of current timber management practices on a region-wide scale.

Finally, we recommend the Forest Service adopt alternative strategies for maintaining viable populations of wildlife that depend on old growth forests on the Tongass National Forest. One such alternative is provided in the Interagency Viable Populations Committee's March 1993 draft report. Protection of single nest sites is only a short-term strategy, and cannot be expected to succeed in maintaining goshawk and marbled murrelet populations on the Tongass National Forest.

Chapter 4, page 17, paragraph 3. The third sentence should read, "For example, the 81 acres of habitat needed for goats can overlap..."

Chapter 4, page 25, paragraph 1. Using Figures 3-19 and Figure 3-10 showing suitable available and accessible areas, we recommend that moving Units 1, 2, the west half of 3, and 5 to the areas north of Unit 6 and west of Unit 9 be addressed in the final EIS. This modification would keep harvests in high-value winter goat range to a minimum.

Chapter 4, page 42, paragraph 3. Some of the action alternatives indicate timber harvest in high-value winter goat habitat, which may result in significant changes in goat distribution. Opening the forest canopy will allow snow accumulation and decrease goat use in these areas.

Appendix A. We recommend that the Unit Cards show the 100-foot buffer along anadromous fish streams.

We request copies of any completed or preliminary wildlife studies in preparation of the Campbell Timber Sale be sent to the Fish and Wildlife Service's Ecological Field Office in Juneau prior to the completion of the Final EIS.

We appreciate the opportunity to comment on this draft document.

Sincerely,

A handwritten signature in dark ink, appearing to read "Paul Harte", with a long, sweeping horizontal line extending to the right.

Regional Environmental Officer
Alaska

United States
Department of
Agriculture

Forest
Service

Alaska Region Tongass National Forest
Stikine Area
P.O. Box 309
Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

Paul Gates
United States Department of the Interior
Office of Environmental Affairs
1689 C Street, Room 119
Anchorage, Alaska 99501

Dear Mr. Gates:

I appreciate the Fish and Wildlife Service's comments on the Draft Environmental Impact Statement (DEIS) for the Campbell Timber Sale and would like to take this opportunity to respond. The format of my response will follow the outline of your response dated July 8, 1993. Your letter and my response will be published in the Final Environmental Impact Statement (FEIS).

GENERAL COMMENTS

We appreciate your acknowledgement of our efforts to coordinate interagency planning for this project. I would like to thank the Fish and Wildlife Service in return for their participation in field reviews, discussions, surveys and diving of the log transfer sites. The expertise of the your personnel was of great assistance to us and we hope to continue these interagency cooperative efforts on future projects. We are also looking forward to trying the helicopter overstory removal techniques proposed on this project.

SPECIFIC COMMENTS

Road closures are described in the road cards of the FEIS. We believe the road closure methods proposed would be effective in eliminating access by motorized vehicles. Both road systems contain steeper areas near saltwater where the road will need to "cut" into the hillside. At these locations, after harvest is complete, the cut would be filled in, returned to the existing grade and reseeded. This method is the most effective method of road closure because it eliminates visual evidence of the road as well as providing for the reestablishment of the sideslope which vehicles are unable to negotiate. In addition, alder is expected to seed in quickly on roads and will eventually present a formidable obstacle. Motorized boating use of Frank and Tom Creeks will continue.

Alternative F did not include Unit #21. The number has been removed from the map in the FEIS.

Where the terrain allows all proposed roads have been located away from deposits of blue clay and sand. Some short segments of the roads proposed under Alternatives B, E, F and G do encounter both of these deposits and could not be avoided. We believe that water quality concerns would be adequately mitigated and addressed through road design measures (See FEIS, Appendix A, Unit and Road Cards). Blue clay areas would be covered by fill for the road bed but not excavated and short sections of the Frank Creek road would require cribbing to ensure that sand areas are crossed, with reduced erosion. However, I do agree that this does not eliminate all possible risks to water quality concerns. For this and other concerns brought up in comments on the DEIS, roads will not be part of the selected alternative.

Thank you for your suggestions. Figure 1-1 has been improved to show the surrounding VCU's in the FEIS and the acronym "HSI" will be listed in the glossary.

We did not mean to imply that there were no goshawk nests based on limited surveys in our statement in the DEIS on 3-49. This statement is intended to indicate to the reader that we did conduct some surveys but were unable to confirm the existence of goshawks in the study area. This statement has been changed in the FEIS to make this clearer.

You are correct. For the most part, high hazard soils in the Frank Creek watershed were not included as a component of the freshwater influence zone. Those that were included either fell within the riparian zone/streamside buffer due to slope break location or were identified as active or recent creep paths and may appear to be streamcourses on the map.

Thank you for pointing out several mapping errors. In the FEIS stream 107-40-10390 is labeled correctly and figures 3-19 and 4-3 are consistent.

The referenced statement in the DEIS on 4-2 was intended to refer to harlequin ducks and has been clarified in the FEIS. Vancouver Canada geese would be expected to nest along stream areas adjacent to harvest units as well as further upstream. Harlequin ducks usually nest along rocky shores adjacent to the rapids of turbulent streams. This type of habitat is found in the upper reaches of Tom and Campbell Creeks.

We are familiar with the guidelines for siting Log Transfer Facilities and their effects on the marine environment. The terrain in the Frank Creek watershed is extremely limiting and the site selected is the best we could locate in consultation with your department and other agencies. The Frank Creek Log Transfer Site does not meet all of the ATTF criteria for a transfer site. A habitat survey and dive was performed near this site in 1982 and again in 1993 by the Fish and Wildlife Service upon our request. These investigations and subsequent reports stated that although there were mitigating circumstances (rehabilitation, low volume, one time use, etc.) this site was not recommended

for development. For this reason, the selected alternative (Alternative P) drops this site and the associated road.

The West Face Log Transfer Site was identified at the time of the DEIS but was inadvertently left off the map. This site was also investigated by divers in 1993 and subsequent recommendations appear favorable for the development of a LTF at this site. New analysis and information is included in the FEIS. The proposed West Face Log Transfer Site is sited on a colluvial/alluvial fan formed mostly of cobble, rubble, and boulders with gravel comprising a minor component. There are two streams on the northeast side of the fan, one ephemeral and one perennial. Although the primary hillslope delivery channel is still quite active, creating an ephemeral stream condition, there is no evidence that its location has changed in the recent past. Gradient of this stream is steep in the lower 700-foot reach, ranging from 4.5% in the first 100 feet to 15% in the next 600 feet. Instream wood has been pushed high against the streambanks or carried out to sea as there is virtually no wood in the middle of the channel to create pools. The perennial stream has a gentle enough gradient in the lower 300-foot reach to support fish. Two juvenile coho and two trout fry were electroshocked in this reach, all within the first 100 feet from saltwater. The intertidal area is comprised of cobble and rubble, and according to dive reports, the subtidal area falls off steeply to deep water. No intertidal spawning by pink and chum salmon has been observed and, given the size of the substrate, it is very doubtful it occurs. There are no mudflats, sandflats, or grassflats to create an estuarine condition. The transition from freshwater to saltwater is a very abrupt one. Although the LTF does not meet the S1 guideline (Proximity to Rearing and Spawning Areas), we do not feel that this site possesses the estuarine features this guideline was developed to protect. Logs in bag booms or log rafts would provide more cover for feeding smolts than now exists. Upstream spawners such as coho do not require the protection that intertidal spawners such as pink and chum do.

Loading of logs directly on a barge still remains an option for this sale at the discretion of the operator. I did not want to make this required because I believe it would limit the number of potential operators who could log the sale, increase costs and complicate logistics. The development and operation of the West Face site increases the feasibility of logging the sale while responding to Log Transfer Site development guidelines.

I would like to refer you to my May 27, 1993 letter to Nevin Holmberg regarding goshawk management guidelines. This letter discusses the fact that the guidelines have been in effect only since August 1992 and thus, there is not sufficient data to evaluate the effectiveness of the guidelines. The Forest Service is presently funding a study in cooperation with Alaska Department of Fish and Game to study goshawk habitat relationships. We would welcome participation by the Fish and Wildlife Service.

Currently there are no formal Forest Service management guidelines for marbled murrelets. The objective of the guidelines suggested in the DEIS is to minimally maintain forest interior conditions around individual, discovered nests to maintain the integrity of the microsite. We concur that long-term, regional management strategies for these species are desirable. However,

development and adoptions of such regional plans is beyond the scope of this project.

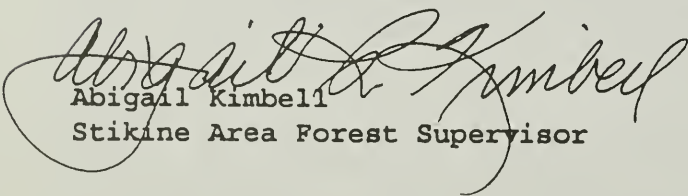
The sentence concerning retention on page 4-17 of the DEIS has been corrected in the FEIS.

After we received the comments on the DEIS, we consulted with our biologists, the Fish and Wildlife Service and ADF&G regarding the goat winter range habitat issue. In the selected alternative, I made the decision to drop units #1, #2 and the west half of unit #3. I believe that this change adequately responds to the need to protect this type of habitat within the WAA (the landscape scale) and the VCU (the project scale). There is a total of 3822 acres of high value goat winter range in the WAA and 1092 acres in the VCU. Some of the best of this habitat is adjacent to saltwater where maritime influences seem to reduce snowloads over similar interior areas. There are 1450 acres of saltwater facing high value goat winter range in the WAA and 670 acres in the VCU. The largest contiguous block of this habitat in the WAA is 660 acres and occurs on the West Face and the adjacent Marten Creek VCU. The selected alternative would harvest 19 acres (3%) from the fringes of this block, leaving the rest intact and minimizing any potential problems with utilization of the rest of the block. The selected alternative would harvest a total of 95 acres of high value goat winter range, leaving 97% of this habitat in the WAA and 91% in the VCU. Most of this remaining habitat is not scheduled for harvest either in the current Forest Plan or the preferred alternative in the revision.

The area suggested as a suitable area to replace timber volume lost under this strategy would cost more to log than the value of the timber (this stand has very low volume class 4 timber). We concur that goats are unlikely to utilize harvested areas. However, we feel there is sufficient high value habitat remaining, that goats will not abandon use of the West Face and therefore will not significantly change goat distribution. Dropping units #1, #2 and the west half of unit #3 in the selected alternative will further mitigate any potential impacts to goats.

The unit cards in the FEIS will show the 100' buffer along anadromous fish streams.

Copies of inventory reports prepared for the Campbell Timber Sale were sent to the Fish and Wildlife Service's Field Office in Juneau. Thank you again for your comments regarding this project. We look forward to continuing to cooperate on future projects with Fish and Wildlife personnel.


Abigail Kimbell
Stikine Area Forest Supervisor



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of the Chief Scientist
Washington, D.C. 20230

July 7, 1993

Ms. Meg Mitchell
U.S. Department of Agriculture
Forest Service
P.O. Box 51
Wrangell, Alaska 99929

Dear Ms. Mitchell:

The National Oceanic and Atmospheric Administration's comments on the Draft Environmental Impact Statement for the Proposed Campbell Timber Sale, Stikine Area, Tongass National Forest, Alaska, will be sent to you under separate cover by the National Marine Fisheries Service, Alaska Region. We hope our comments will assist you. Thank you for giving us an opportunity to review the document.

Sincerely,

(for) David Cottingham
Director
Ecology and Conservation Office

cc: NOAA/NMFS - Mr. Steven Pennoyer





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

July 6, 1993

Ms. Meg Mitchell
USDA Forest Service
Tongass National Forest
P.O. Box 51
Wrangell, Alaska 99929

RE: Campbell Timber Sale -- Draft Environmental Impact Statement

Dear Ms. Mitchell:

The Alaska Regional Office has reviewed the Draft Environmental Impact Statement (DEIS) for the Campbell Timber Sale and offers the following comments for your consideration.

Our main concern with the DEIS is related to the transfer of timber to marine waters. Our records indicate that the selected locations for log transfer are not among those identified during site investigations performed in 1982 and 1984. Usually the USDA Forest Service (FS) requests our participation in an investigation and selection of proposed log transfer facility (LTF) locations before DEIS preparation. In this case, we were not notified of the locations you were considering for LTFs or given the opportunity to perform evaluations before selection.

We recommend underwater evaluations of all the proposed or potential sites be made and the information gained be compared with the "Log Transfer Facility Siting, Construction, Operation and Monitoring/Reporting Guidelines" (Alaska Timber Task Force 1985). That information should be incorporated into the Final EIS.

Specific Comments:

Chapter 2, Alternatives. The location of the West Face LTF is not shown on any of the Figures in this chapter.

Chapter 3, Affected Environment, Figure 3-18. Class 1 stream number 107-40-10350 should be number 107-40-10390.

Chapter 4, Environmental Effects, Issue Three. We agree that siting of the LTF and log raft storage facilities is the single most important means of controlling adverse impacts to marine habitat. For that reason it is important to have an underwater evaluation of several possible locations for a LTF site prior to selection of any one location. If a LTF site is selected without an evaluation of the underwater habitats, it is difficult to



provide disclosure of the habitat impact that will be associated with its development. The effects of log transfer on the intertidal and subtidal zones are not adequately described in Chapter 4.

According to Table 4-7, both the West Face and Frank Creek LTFs fail to meet most of the siting guidelines developed by the Alaska Timber Task Force to protect commercially important fish and shellfish spawning and rearing habitats. Those guidelines (maintain a distance greater than 300 feet from the mouths of Class 1 fish streams; keep away from productive intertidal and subtidal zones; keep away from shallow, productive habitats; establish rafting areas in at least 40 feet of water measured at Mean Lower Low Water; and avoid small craft boat anchorages and use areas) were developed to prevent needless destruction of marine habitat and disruption of seafood harvesting activities.

We were unable to locate on the DEIS' maps exactly where the Frank Creek LTF is to be constructed. Previous underwater investigations, performed at the request of the FS, determined that proposed LTF locations on either side of Frank Creek were not suitable for LTF construction because of high marine resource values. The location selected for the Frank Creek LTF appears to be very close to one of those locations.

On page 15, paragraph 1, lists the option of dropping logs into the water or onto a barge and use of the barge as a limbing and chipping platform. The DEIS should indicate where the residue from this operation will be taken and the method of disposal.

Chapter 4, Environmental Effects, Threatened, Endangered & Sensitive Species. Steller is the correct spelling, not Stellar. We concur that this action will not affect the endangered humpback whale or the threatened Steller sea lion. Accordingly, this concludes Section 7 consultation with the National Marine Fisheries Service. However, should project plans change or new information become available that changes the basis of this decision, then consultation should be reinitiated.

Chapter 4, Environmental Effects, page 53, paragraph 3. Deposits of bark and woody debris in the marine environment can have long-term effects on benthic communities. A previous study (Schultz and Berg, 1976) of abandoned LTFs in southeast Alaska indicated that about three acres of marine habitat was affected at each LTF site and that bark/woody debris still persisted on some sites that had been inactive for as long as 30 years. Other studies of old LTF sites indicated that water quality and benthic communities are adversely affected by decaying woody debris (Jackson, 1986; McDaniel, 1973; Schaumburg, 1973). It is our

¹U.S. Fish & Wildlife Service Report. On-site Evaluation of Proposed Log Transfer Facilities for Bradfield Canal, May 23 -26, 1982.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

July 6, 1993

Ms. Meg Mitchell
USDA Forest Service
Tongass National Forest
P.O. Box 51
Wrangell, Alaska 99929

RE: Campbell Timber Sale -- Draft Environmental Impact Statement

Dear Ms. Mitchell:

The Alaska Regional Office has reviewed the Draft Environmental Impact Statement (DEIS) for the Campbell Timber Sale and offers the following comments for your consideration.

Our main concern with the DEIS is related to the transfer of timber to marine waters. Our records indicate that the selected locations for log transfer are not among those identified during site investigations performed in 1982 and 1984. Usually the USDA Forest Service (FS) requests our participation in an investigation and selection of proposed log transfer facility (LTF) locations before DEIS preparation. In this case, we were not notified of the locations you were considering for LTFs or given the opportunity to perform evaluations before selection.

We recommend underwater evaluations of all the proposed or potential sites be made and the information gained be compared with the "Log Transfer Facility Siting, Construction, Operation and Monitoring/Reporting Guidelines" (Alaska Timber Task Force 1985). That information should be incorporated into the Final EIS.

Specific Comments:

Chapter 2, Alternatives. The location of the West Face LTF is not shown on any of the Figures in this chapter.

Chapter 3, Affected Environment, Figure 3-18. Class 1 stream number 107-40-10350 should be number 107-40-10390.

Chapter 4, Environmental Effects, Issue Three. We agree that siting of the LTF and log raft storage facilities is the single most important means of controlling adverse impacts to marine habitat. For that reason it is important to have an underwater evaluation of several possible locations for a LTF site prior to selection of any one location. If a LTF site is selected without an evaluation of the underwater habitats, it is difficult to



provide disclosure of the habitat impact that will be associated with its development. The effects of log transfer on the intertidal and subtidal zones are not adequately described in Chapter 4.

According to Table 4-7, both the West Face and Frank Creek LTFs fail to meet most of the siting guidelines developed by the Alaska Timber Task Force to protect commercially important fish and shellfish spawning and rearing habitats. Those guidelines (maintain a distance greater than 300 feet from the mouths of Class 1 fish streams; keep away from productive intertidal and subtidal zones; keep away from shallow, productive habitats; establish rafting areas in at least 40 feet of water measured at Mean Lower Low Water; and avoid small craft boat anchorages and use areas) were developed to prevent needless destruction of marine habitat and disruption of seafood harvesting activities.

We were unable to locate on the DEIS' maps exactly where the Frank Creek LTF is to be constructed. Previous underwater investigations, performed at the request of the FS, determined that proposed LTF locations on either side of Frank Creek were not suitable for LTF construction because of high marine resource values. The location selected for the Frank Creek LTF appears to be very close to one of those locations.

On page 15, paragraph 1, lists the option of dropping logs into the water or onto a barge and use of the barge as a limbing and chipping platform. The DEIS should indicate where the residue from this operation will be taken and the method of disposal.

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¹U.S. Fish & Wildlife Service Report. On-site Evaluation of Proposed Log Transfer Facilities for Bradfield Canal, May 23 -26, 1982.

position that LTFs should be located in areas where long-term effects to marine resources are minimized.

We appreciate the opportunity to comment.

Sincerely,

A handwritten signature in dark ink, appearing to read "Steven Pennoyer", with a stylized, flowing script.

Steven Pennoyer
Director, Alaska Region

cc: ADFG, Douglas, Petersburg
FWS, Juneau, Anchorage
ADEC, Juneau

EPA, Anchorage
CE, Env. Sec., Anchorage
ADNR, Juneau

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P.O. Box 21668, Juneau, Alaska 99802. 64pp.

United States
Department of
Agriculture

Forest
Service

Alaska Region

Tongass National Forest
Stikine Area
P.O. Box 309
Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

Steven Pennoyer
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802

Dear Mr. Pennoyer,

Thank you for your comments on the Draft Environmental Impact Statement (DEIS) for the Campbell Timber Sale. I would like to take this opportunity to respond. The format of my response follows the general outline of your response. Both letters will also be published in the Final Environmental Impact Statement (FEIS).

Two out of the three Log Transfer Sites (LTF) discussed in the DEIS were investigated in 1982 (a site near the Frank Creek site and the Tom Creek site were investigated) prior to completion of the first Campbell Timber Sale planning effort. This sale although offered, was never sold. The third (West Face) site came under consideration during the recent timber sale planning process during the winter of 1993. The Interdisciplinary Team felt that an area was needed to limb and sort logs if they were dropped directly into saltwater by the helicopter. In the spring, the Fish and Wildlife Service and the National Marine Fisheries Service were contacted to conduct an underwater survey of the Frank Creek and West Face sites while they were going to be conducting other surveys in the area. Unfortunately, the certified National Marine Fishery diver took ill and could not go on the trip thereby canceling the dives in the Campbell area prior to release of the DEIS. In June, 1993 at our request the Fish and Wildlife Service and the National Marine Fishery Service were contacted again to reschedule the dives. Although the National Marine Fishery Service diver could not make the trip, two divers from the Fish and Wildlife Service dove the Frank Creek and West Face sites on June 29, 1993.

In the 1993 dive report, the Frank Creek site was again not recommended for development because it is shallow, productive and would require a relatively long intertidal fill (it does not meet three of the ATTF criteria according to the report). The Interdisciplinary Team felt that the Frank Creek site was important due to the fact that without a road system, logs from some units would have to be flown too far to saltwater and some timber stands would therefore be inaccessible. The proposed Frank Creek site is the best site along

Frank Creek even though it only meets some of the ATTF requirements. Logging in Frank's Creek is more favorable than logging in Tom's Creek as far as upland habitat values for wildlife are concerned. These factors made it important for us to fully investigate all the potential ways of logging the Frank Creek area and display the tradeoffs in impacts.

The Fish and Wildlife Service investigations seem favorable to the development of and LTF at the West Face site. The FEIS analysis in Chapter 4 has been updated and the dive report has been included in Appendix E of the FEIS. In making the decision and constructing the selected alternative, I took into account the information and conclusions from the dive report. The selected alternative (Alternative P) will not develop the Frank Creek site and units which can be flown to saltwater will be logged. A drop site will be located in over 60 feet of water as recommended by ADEC (See FEIS, Appendix A, Unit and Road Cards).

The proposed West Face Log Transfer Site is sited on a colluvial/alluvial fan formed mostly of cobble, rubble, and boulders with gravel comprising a minor component. There are two streams on the northeast side of the fan, one ephemeral and one perennial. Although the primary hillslope delivery channel is still quite active, creating an ephemeral stream condition, there is no evidence that its location has changed in the recent past. Gradient of this stream is steep in the lower 700-foot reach, ranging from 4.5% in the first 100 feet to 15% in the next 600 feet. Instream wood has been pushed high against the streambanks or carried out to sea as there is virtually no wood in the middle of the channel to create pools. The perennial stream has a gentle enough gradient in the lower 300-foot reach to support fish. Two juvenile coho and two trout fry were electroshocked in this reach, all within the first 100 feet from saltwater. The intertidal area is comprised of cobble and rubble, and according to dive reports, the subtidal area falls off steeply to deep water. No intertidal spawning by pink and chum salmon has been observed and, given the size of the substrate, it is very doubtful it occurs. There are no mudflats, sandflats, or grassflats to create an estuarine condition. The transition from freshwater to saltwater is a very abrupt one. Although the LTF does not meet the S1 guideline (Proximity to Rearing and Spawning Areas), we do not feel that this site possesses the estuarine features this guideline was developed to protect. Logs in bag booms or log rafts would provide more cover for feeding smolts than now exists. Upstream spawners such as coho do not require the protection that intertidal spawners such as pink and chum do.

Circumstances of timing and logistics prevented the involvement of your personnel in the site investigations for this project. I apologize for any miscommunication there may have been with your agencies personnel regarding the location and suitability of the log transfer sites. The various alternative means and logistical planning for the transportation system of this sale is more complex than other sales. We look forward to continuing to work closely with the National Marine Fishery Service on this and other projects.

Specific Comments:

Thank you. The location of the West Face LTF was inadvertently left off the Alternative Maps in the DEIS. This has been corrected in the FEIS and LTF cards are also located in Appendix A in the FEIS.

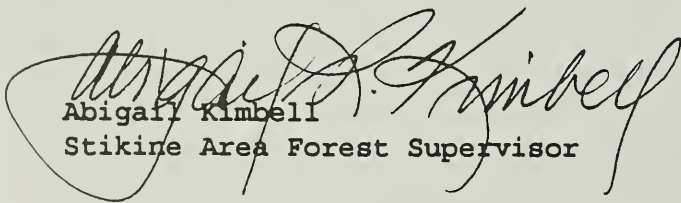
Thank you. The stream has been renumbered in the FEIS.

Underwater investigations of all sites are now complete and are provided in Appendix E of the FEIS. The analysis in Chapter 4 has also been revised in the FEIS. The terrain in the area is very limiting. The three sites proposed among the alternatives were the best possible sites we could find.

We agree that the method of disposal of limbs should be disclosed in the FEIS. The limbs and residue will be taken to the West Face LTF where they will be burned. This is another reason why the West Face site is needed to feasibly log the area. Dropping limbs back into the units is very cumbersome and expensive. The locations of log drops into saltwater and rafting areas will also be disclosed in the FEIS (See FEIS, Appendix A, Unit and Road Cards). Thank you.

Thank you. The "Steller" sea lion was misspelled in the DEIS. This has been corrected in the FEIS.

I understand the position of your agency that LTFs should be located in areas where long-term effects to the marine resources are minimized. In the Campbell project area the best LTF site was unfortunately located in the area I chose not to harvest due to high upland values thereby, establishing some tradeoffs between upland and marine resource values. However, I believe that the selected alternative does plan for the transport of logs so that long-term effects to the marine resources are minimized. Thank you again for your comments. We look forward to future exchanges of information with the expertise of the National Marine Fishery Service.



Abigail Kimbell
Stikine Area Forest Supervisor



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

AUG 12 1993

REPLY TO
ATTN OF: WD-126

Meg Mitchell, Team Leader
Stikine Area
Tongass National Forest
P.O. Box 51
Wrangell, Alaska 99929

Dear Ms. Mitchell:

In accordance with our responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act, we have reviewed the **Campbell Timber Sale**, Draft Environmental Impact Statement (draft EIS). The draft EIS analyzes five action alternatives to harvest 8.8 to 22.1 million board feet of timber from about 383 to 1,007 acres southeast Wrangell, Alaska. We provided scoping comments on May 11, 1992.

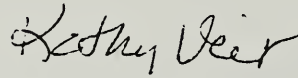
Based on our review, we have rated the draft EIS EO-2 (Environmental Objections - Insufficient Information). This rating and a summary of our comments will be published in the *Federal Register*. The enclosure provides additional comments and details.

Our primary objections are for the sale's impact on water quality from construction and operation of log transfer facilities. Alternatives including no log transfer facilities need to be considered. We are also concerned that assuring that best management practices are implemented for timber harvest and road construction may not ensure that the Alaska Water Quality Standards (WQS) will be met. Water quality monitoring is required to ensure compliance with WQS. WQS may be exceeded as a result of the proposed sale.

Additional information is needed on effectiveness monitoring from the water quality effects of timber harvest and road construction. Information on the effects of alternative log transfer facilities is also needed.

Thank you for the opportunity to review this draft EIS. Please contact Wayne Elson at (206) 553-1463 if you have any questions about our comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Kathy Veit". The signature is fluid and cursive, with the first name "Kathy" and last name "Veit" clearly distinguishable.

Kathy Veit, Chief
Program Coordination Branch

Enclosure

cc: Jim Ferguson, ADEC
Duane Peterson, NMFS
ADFG

**Detailed Comments for
Campbell Timber Sale
Draft Environmental Impact Statement (draft EIS)**

Log Transfer Facilities

Site Specific Information

Based on the information available to EPA, construction of log transfer facilities for this project would cause significant impact. Alternatives which include helicopter logging only need to be seriously considered.

The draft EIS provides only a cursory review of potential marine impacts associated with development of the three log transfer facilities. Chapter 3, Affected Environment, contains a generic description of marine estuaries and intertidal zone. EPA believes that the final EIS should present site-specific information for all proposed log transfer facilities, based on an underwater survey of biological resources. At a minimum, the appendix should include the dive report from the U.S. Fish and Wildlife Service's 1982 underwater survey of Frank and Tom Creek¹. In addition, the document should include a single map showing the precise locations of the proposed log transfer sites.

Tom Creek Log Transfer Facility: In 1982, the U.S. Fish and Wildlife Service conducted an underwater survey at two sites within the Tom Creek area. The two sites displayed similar physical and biological characteristics. However, the site near the entrance to the cove was more steeply sloped with stronger currents. Therefore, the report concluded that the development of a log transfer facility at the site nearest the entrance to the cove (Site #4) would cause less impacts to aquatic resources.

After reviewing the results of the 1982 dive survey, EPA would not object to development of a log transfer facility at Site #4. In the draft EIS, only Alternative E includes the harvest of timber along the Tom Creek drainage and transfer to marine waters at Site #4.

Frank Creek Log Transfer Facility: The 1982 dive report also evaluated marine resources at two proposed log transfer sites near Frank Creek. The report also summarized escapement data from 1966 through 1979. This data shows peak escapement values of 9108 for pink salmon (1977), and 4004 for chum salmon (1974).

The divers evaluated two sites on either side of the creek. Both of the proposed sites are within 300 feet of the mouth of Frank Creek, and therefore do not meet the Alaska Timber Task Force Guideline relating to proximity to rearing and spawning areas. This guideline is based on the Alaska Forest Resources and Practices Regulations, which **exclude log transfer siting in these most valuable and**

highest risk locations (11 AAC 95.150(c)). Estuarine areas adjacent to the mouths of anadromous fish streams serve as important feeding areas for salmon fry and smolts while they acclimate to saltwater. Elimination or degradation of these areas can force outmigrants into deeper waters where there is greater risk of predation. Outmigrant salmon fry are especially vulnerable and have particularly high value to the fishing industry.

On the west side of the creek, divers recorded a depth of over 150 feet at a distance of 300 feet from shore. Moderate shoreline currents were observed. Large numbers of juvenile shrimp, hermit crabs, and other marine organisms were recorded within the intertidal flats. The intertidal zone at the entrance to the creek also provided food and cover for pink, chum, and coho salmon, steelhead trout, cutthroat trout, and Dolly Varden. In addition, an active bald eagle nest tree was found approximately 150 feet west/northwest of the site. The U.S. Fish and Wildlife Service concluded that construction of a log transfer facility at this site would adversely impact aquatic life around the mouth of Frank's Creek through the accumulation of bark debris and other fines.

On the east side of the creek, the marine floor dropped only 30 feet at a distance of 300 feet from shore. The divers reported extensive shallows and the absence of current. Therefore, development of a log transfer facility at this site could impact a large area of the nearshore zone. The site was underlain with blue clay, and supported clams, larval shrimp, hermit crabs, dungeness crabs, blue mussels, and other marine species.

The data provided by the 1982 dive survey indicates that resource values at the mouth of Frank's Creek are high, and would be adversely impacted by development of a log transfer facility. These impacts should be thoroughly documented in the final EIS.

An alternative to developing a log transfer facility at Frank's Creek is the use of helicopters to transport logs to deep waters (Alternative D). This option would preclude economically viable harvest beyond one mile of the creek mouth. EPA strongly recommends that the U.S. Forest Service reconsider Alternative D as a preferred alternative, or revise the preferred Alternative F to include only helicopter logging of the Frank's Creek drainage.

West Face Log Transfer Facility: The draft EIS proposes to develop a log transfer facility and sortyard at the West Face site for all alternatives except Alternative B. West Face is evaluated for compliance with the Alaska Timber Task Force Guidelines. The data provided in the draft EIS indicate that the site is a shallow, productive intertidal habitat close to an anadromous fish stream. The site is also near an intensively used commercial shellfishing area.

Additional site-specific data is essential to assess potential impacts of a log transfer facility on these aquatic resources. The accumulation of bark within the shallow, intertidal area may adversely impact fishery resources. However, EPA would not object to development of this site for direct land to barge transfer of logs, or for helicopter transfer of logs into deeper waters. These alternatives would avoid the adverse impacts of bark discharge, shading, and compaction associated with log transfer, rafting, and storage.

Potential Impacts to Marine Resources

The most significant problem associated with water storage of logs appears to be bark loss.² Schultz and Berg measured bark accumulations at 32 inactive log transfer facilities in southeast Alaska. They found deposits up to 182 acres, with an average of 1.96 acres per site (excluding the 182-acre site).³ The adverse impacts of wood waste deposits on the aquatic ecosystem are well documented, and include smothering of organisms and chemical changes caused by leaching and decomposition of the waste.^{4,5,6} Deposits over 3 cm deep result in measurable changes in the benthic community.⁷ Bark and woody debris decay slowly and may remain for decades.⁸

The Tongass Land Management Plan Revision Supplement to the draft EIS (August 1991) outlines the U.S. Forest Service's goal to operate Log Transfer Facilities (LTFs) in areas which will "best avoid or minimize potential impacts on water quality, aquatic habitat and other resources. ... The USDA Forest Service has adopted the 'Log Transfer Facility Siting, Construction, Operation, and Monitoring/ Reporting Guidelines' developed by the Alaska Timber Force." The Alaska Timber Task Force guidelines were developed by private, public, and resource agency personnel to delineate methods to minimize adverse environmental impacts of log transfer facilities. The guidelines stress that facility siting is the most effective means of reducing the adverse affects associated log transfer facilities.

The potential impacts of the proposed log transfer activities are poorly documented in the draft EIS. It is unreasonable to assume that the average reader is aware of issues associated with bark loss at log transfer sites.

The preferred alternative in the Campbell Timber Sale draft EIS includes two log transfer facilities which do not meet the Alaska Timber Task Force Guidelines (West Face and Frank Creek). Impacts associated with bark accumulation at these two sites may be significant, and should be fully outlined in the final EIS.

Existing State and Federal Regulations

The U.S. Forest Service may wish to incorporate a discussion of state and federal regulations governing log transfer facilities. In 1983, EPA determined that log transfer into marine waters is a point source discharge, and therefore requires a National Pollutant Discharge Elimination System (NPDES) permit. These permits are based on state water quality standards and/or effluent standards promulgated by EPA under the Clean Water Act. Since there are no effluent standards for LTFs, NPDES permits are based on EPA's best professional judgement. Permit conditions rely heavily on the Best Management Practices and Monitoring procedures outlined by the Alaska Timber Task Force.

The Corps of Engineers also regulates construction of log transfer facilities through section 404 of the Clean Water Act. A section 404 permit is required for the discharge of dredged or fill material into U.S. waters.

The state of Alaska must certify that any permitted discharge of pollutants into U.S. waters is consistent with the Alaska State Water Quality Standards. The state typically allows bark accumulation within a one-acre of deposit.

Log Rafting and Storage

The Alaska Timber Task Force Guidelines recommend log rafting and storage in depths greater than 40 feet deep at mean lower low water (MLLW). "(R)ooted aquatic macrophytes and algae generally begin to decrease in density in Southeast Alaska below this depth. Rafting in 40+ feet MLLW or more will protect these organisms and habitat (less than 40 feet MLLW) from bark accumulation and shading. Log raft storage may occur at depths less than 40 feet (MLLW) depending on biological productivity, sensitivity to shading and potential risk of bark accumulations."

The draft EIS states that the proposed log transfer facilities at Frank Creek and West Face would not allow log rafting and storage in waters over 40 feet deep at mean lower low water (MLLW). The final EIS should document the location and depth of all proposed log rafting and storage areas.

Conclusion

1. The final EIS should summarize the impacts associated with log transfer facilities. Background information should include an explanation of the Alaska Timber Task Force Guidelines, and their relevance to U.S. Forest Service activities.

2. The final EIS should contain site-specific information documenting marine resources at each proposed log transfer facility. The appendix should include these dive reports.
3. The underwater survey conducted at Frank Creek indicates that high value fishery resources would be adversely impacted by the proposed log transfer facility. Therefore, EPA recommends timber harvested from this drainage be transferred to marine waters via helicopter.
4. No underwater survey is available for the proposed log transfer facility at West Face. However, the draft EIS documents important resources in the immediate vicinity of the proposed site. Therefore, a site-specific underwater survey is necessary to determine potential impacts of placing logs directly into the water. EPA would not object to construction of a land-to-barge transfer facility at this site.
5. The final EIS should contain a single map of all log transfer facility alternatives. Future conflicts may also be avoided by providing plan drawings with the location and design of the proposed log transfer devices, and depths of rafting and storage areas.

Monitoring

The rationale and strategy for monitoring in the Campbell Timber Sale needs to be consistent with the purpose of the project and the overall monitoring plan for the Stikine Area. The monitoring discussion on Appendix B does not reflect the first issue included in Chapter 4, for example. That is the impacts that harvest and the transportation systems could have on the productivity and function of the freshwater system (page 4-1). Most of the items in Appendix B relate to implementation monitoring not effectiveness monitoring.

This lack of a well considered monitoring strategy precludes reviewers from influencing the scope of monitoring and whether BMPs are likely to be effective in protecting beneficial uses and meeting water quality standards (WQS).

Monitoring is particularly important, because it provides a check on the predictions of effects for the action alternatives. It is important to evaluate the effectiveness of planned mitigation measures to protect potentially affected resources.

The key habitat elements of the aquatic ecosystem are water temperature, sediment, and large wood (page 3-54), for example. The final EIS should discuss how these key elements will be monitored. A detailed monitoring plan would include types of surveys, location and frequency of sampling, parameters to be monitored, indicator species, budget, procedures for using data or results in plan implementation, and availability of results to interested and affected groups. A helpful document has

recently been completed for developing water quality monitoring plans: *Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska*, EPA/910/9-91-001, May 1991.

The final EIS also needs to include a feedback mechanism which relies upon monitoring so that standards and guidelines, BMPs, standard operation procedures, intensity of monitoring, and timber sale administration are adjusted when effectiveness monitoring indicates a need. Providing such a process for adjustment will ensure that mitigation measures will improve in the future and that unforeseen effects are recognized and minimized.

Water Quality Standards

From reviewing the EIS we are unable to determine how the action alternatives will be consistent with the sediment standard. However, the responsibility is on the Forest Service to demonstrate in advance that timber harvest and road construction will not cause beneficial use impairment and cause standards exceedances.

Class I and II streams will have at least 100 foot buffers, however it is not clear what buffering, if any, will be placed around Class III streams. We are concerned that water quality standards will not be met and beneficial uses may not be protected because the draft EIS provides little if any protection for Class III or first and second order (headwater intermittent and perennial) streams. The final EIS needs to include full protection of first and second order streams.

These first and second order streams are important in maintaining downstream system integrity and water quality as well as providing fisheries and amphibian habitat/refugia. Disturbed first and second order streams may become sediment sources to downstream areas. In addition, loss of woody vegetation along these headwater streams may eventually lead to reduced large organic debris in downstream reaches. As stated in the draft EIS sediment and large wood are key habitat elements (page 3-54). The greatest opportunity for maintaining stream conditions through BMPs may be on first and second order streams.

Page Specific Comments

- 2-22 The text refers to "past experience" regarding the effectiveness of buffers to provide shading, bank stability and continued supply of large wood. To what extent and how has this effectiveness been determined? The final EIS should include summaries of any stream condition surveys that have been completed for timber harvests that have included buffers in SE Alaska.

- 2-23 The potential adverse effects to wildlife of helicopter use is identified along with mitigation measures. Are there recreation areas that may be affected by helicopter noise?
- 2-23 The EIS indicates that a floating camp will be used for this project. The final EIS should include additional information on water quality effects. What permits do floating logging camps have to obtain? What are the water quality issues? What is the compliance rate for permitted facilities? Obtaining permits does not in itself mean that there will be no water quality effects.
- 4-4 Alternative E (22.1 million board feet on 1,007 acres) is inferred to be the maximum harvest level for the Campbell study area over the next 50 years, regardless of which alternative is chosen. If this is true, another way to compare the alternatives would be to have 22.1 million board feet over 50 years with different rates of harvest.
- 4-5 Has the Cumulative Proportion of Area Harvested by Watershed Sensitivity model (McCorison et. al, 1988) been validated?

How does the McCorison model relate to the draft Tongass Land Management Plan Revision (August 1991) standard and guideline on cumulative watershed effects (CWEs)? Page 4-63 of the draft revision states, "Limit large scale ground-disturbing activities and associated roading to no more than 35 percent of the acres of 3rd order or larger watersheds in less than a 15-year period unless a cumulative watershed effects analysis during project planning indicates otherwise."

- B-3 Under "potential improvement projects," log structures are proposed for first and second order streams to increase steelhead and coho rearing habitat. This need clarification. Is this proposal meant to offset the damage done to first and second order streams (i.e. no buffer zones in Class III streams)? If so, such a habitat improvement strategy is inappropriate.

SUMMARY OF THE EPA RATING SYSTEM
FOR DRAFT ENVIRONMENTAL IMPACT STATEMENTS:
DEFINITIONS AND FOLLOW-UP ACTION *

Environmental Impact of the Action

LO—Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC—Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO—Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU—Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1—Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2—Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3—Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussion are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 policy and Procedures for the Review of Federal Actions Impacting the Environment.

United States
Department of
Agriculture

Forest
Service

Alaska Region

Tongass National Forest
Stikine Area
P.O. Box 309
Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

Kathy Veit
United States Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Dear Ms. Veit

Thank you for your comments on the Draft Environmental Impact Statement (DEIS) for the Campbell Timber Sale. The comment period deadline for the DEIS was July 14, 1993. Your comments were received on August 12, 1993. However, your comments have been considered important to the planning of this sale and I would like to take this opportunity to respond. The format of my response follows the general outline of your response. I will first address your five conclusions which start on page four of your letter and then address your points concerning monitoring, water quality standards and page specific comments. Your letter and this response will be published in the Final Environmental Impact Statement (FEIS).

Conclusions

1. Thank for the summary of existing site specific information, potential impacts of bark deposition and existing state and federal regulation that you provided us in your letter. Much of this information is confusing to the reader. Your review provides us with clear and brief summary, parts of which we can include in the FEIS as you suggest.
2. The FEIS will contain more site specific information documenting marine resources at each proposed log transfer facility and Appendix E will contain the dive reports.
3. The selected alternative (Alternative P) was formulated specifically to incorporate comments on the DEIS. This alternative only develops the West Face LTF for the transfer of logs. The logs from the Frank Creek watershed will be flown directly to saltwater (drop will be in over 60' of water as recommended by ADEC). The Frank Creek road will not be developed under the selected alternative thereby increasing helicopter yarding distances, costs and making some areas inaccessible for harvest.

4. Two out of the three Log Transfer Sites (LTF) discussed in the DEIS were investigated in 1982 (a site near the Frank Creek site and the Tom Creek site were investigated) prior to completion of the first Campbell Timber Sale planning effort. This sale although offered, was never sold. The third (West Face) site came under consideration during the recent timber sale planning process during the winter of 1993. The Interdisciplinary Team felt that a land based area was needed to limb and sort logs if they were dropped directly into saltwater by the helicopter. In the spring, the Fish and Wildlife Service and the National Marine Fisheries Service were contacted to conduct an underwater survey of the Frank Creek and West Face sites while they were going to be conducting other surveys in the area. Unfortunately, these dives, scheduled before the release of the DEIS were cancelled when the certified diver from the National Marine Fishery Service was unable to make the trip. In June, 1993 at our request the Fish and Wildlife Service and the National Marine Fishery Service were contacted again to reschedule the dives. Although the National Marine Fishery Service diver could not make the trip, two divers from the Fish and Wildlife Service dove the Frank Creek and West Face sites on June 29, 1993.

In the 1993 dive report, the Frank Creek site was again not recommended for development because it is shallow, productive and would require a relatively long intertidal fill (it does not meet three of the ATTF criteria according to the report). The Interdisciplinary Team felt that the Frank Creek site was important due to the fact that without a road system, logs from some units would have to be flown too far to saltwater and some timber stands would therefore be inaccessible or very costly to yard. The proposed Frank Creek site is the best site along Frank Creek even though it only meets some of the ATTF requirements. Logging in Frank's Creek is more favorable than logging in Tom's Creek as far as upland habitat values for wildlife are concerned. These factors made it important for us to fully investigate all the potential ways of logging the Frank Creek area and display the tradeoffs in impacts.

The Fish and Wildlife Service investigation is favorable toward the development of an LTF at the West Face. The proposed West Face Log Transfer Site is sited on a colluvial/alluvial fan formed mostly of cobble, rubble, and boulders with gravel comprising a minor component. There are two streams on the northeast side of the fan, one ephemeral and one perennial. Although the primary hillslope delivery channel is still quite active, creating an ephemeral stream condition, there is no evidence that its location has changed in the recent past. Gradient of this stream is steep in the lower 700-foot reach, ranging from 4.5% in the first 100 feet to 15% in the next 600 feet. Instream wood has been pushed high against the streambanks or carried out to sea as there is virtually no wood in the middle of the channel to create pools. The perennial stream has a gentle enough gradient in the lower 300-foot reach to support fish. Two juvenile coho and two trout fry were electroshocked in this reach, all within the first 100 feet from saltwater. The intertidal area is comprised of cobble and rubble, and according to dive reports, the subtidal area falls off steeply to deep water. No intertidal spawning by pink and chum salmon has been observed and, given the size of the substrate, it is very doubtful it occurs. There are no mudflats, sandflats, or grassflats to create an estuarine condition. The transition from freshwater to saltwater is a very abrupt one.

Although the LTF does not meet the S1 guideline (Proximity to Rearing and Spawning Areas), we do not feel that this site possesses the estuarine features this guideline was developed to protect. Logs in bag booms or log rafts would provide more cover for feeding smolts than now exists. Upstream spawners such as coho do not require the protection that intertidal spawners such as pink and chum do.

An operator who purchases the sale will still have the option of not developing the West Face site if they prefer to fully utilize barges as the limbing, sorting, bundling and landing platform. This would further reduce potential effects on the marine environment, however, we believe a land based sort yard will be necessary to make the sale more feasible to log. In addition, we estimate the deposition from log transfer activities to be minimal with this sale since only 11.6 MMBF will be transferred.

5. The FEIS does contain maps showing the location of the LTFs for each alternative. In addition, larger scale maps are provided in Appendix A of the FEIS. The depth of the storage areas will also be discussed in the Appendix as well as in the Mitigation section of the FEIS.

Monitoring

The monitoring plan in the DEIS has been revised for the FEIS and includes effectiveness monitoring procedures.

Water Quality Standards

We disagree with your assessment that water quality standards may not be met since little protection is afforded first or second order streams. Unit Cards in Appendix A of the FEIS show the specific measures being used to protect streams. Buffers are not deemed necessary for around Class III streams. Protection measures for Class III streams include: 1) felling away from or to bridge/span streamcourses; 2) diameter limit harvest prescriptions which, in effect, creates a buffer of shorter, smaller trees having reduced windthrow susceptibility while maintaining some rooting strength; and, 3) helicopter logging which will maintain full suspension of logs during yarding.

Page Specific Comments

The reference to effectiveness of streamside buffers was taken directly from the BMP Handbook. "When properly applied in recognition of site-specific conditions" has been added as a qualifier to more accurately reflect the constantly evolving state-of-the-art of "best" management practices. Pre-TTRA buffers have not been well documented, save for research projects which led to the development of streamside buffers as a riparian protection measure now manifested in a "Best Management Practice". We agree that stream ecosystem condition surveys would reveal the degree of effectiveness and such surveys have been included in the plan to monitor water quality as it relates to fish habitat.

Chapter 4 of the DEIS and the FEIS summarizes the effects of the proposed harvest on "human habitats." This section concludes that there will likely be reduced use of the area by recreationists seeking a primitive or semi-primitive experience during the 1-2 years the sale is being logged. There also may be a reduction in the use of the area by outfitters and guides although there is less certainty in this assumption. Due to comments on the DEIS, the potential use and value of the area for outfitting and guiding was modeled using some assumptions and a "worst case" scenario is described in the FEIS.

Title 18 permits are required for floating camps and plans should be approved by the Alaska Department of Environmental Conservation. Regulations are extensive and we believe sufficient to have minimum effects on marine water quality. The operator is responsible for acquiring their permits since their facilities quite often vary from operator to operator.

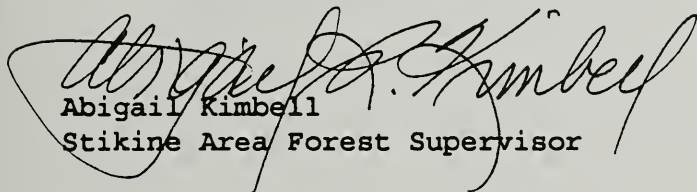
You are correct in stating that Alternative E is our view of the maximum harvest level achievable in the study area at this time. However, this harvest would be the maximum achievable over the rotation which is predicted to be approximately 120-150 years. Alternative E investigates an alternative to make a single entry and remove all the harvestable area at this time. Since the harvest economics of the Tom Creek watershed alone are very poor (See FEIS, Chapter 2, Alternatives Dropped From Further review), the only way this area could be logged at this time is if it were part of a larger sale and the total harvest economics were positive. This was the rationale for having Alternative E in the range. Even when combined with a larger sale, the poor economics of the Tom Creek area result in a negative mid-market assessment (See FEIS, Chapter 4, Issue 10). We felt it was also important to disclose the potential environmental effects of entering the Tom Creek watershed as part of the range of Alternatives. The rest of the Alternatives essentially do as you suggest. Alternatives D and F show how a single entry can be made in Frank Creek and the West Face at this time, thereby reserving the Tom Creek area for a potential future entry (if economics substantially improve in the future). Alternative B provides for the greatest flexibility since future entries could be planned in both Tom Creek or the West Face. Alternative G looks at the situation in another way, by planning a single entry in Frank Creek while planning multiple entries (by group selection) over the rotation along the West Face. Another concern which lead us to the single entry concept in both watersheds (Frank and Tom Creeks) was the concern for brown bears and other wildlife which lead us to strongly consider closing roads for the rotation. Harvest economics are also improved with this strategy. Although we can only disclose the impacts of this harvest entry which are "timely" for NEPA, we are confident that we have adequately considered differing ways to manage the landscape and ecosystems over time to achieve the desired conditions described in the Forest Plan.

The model referred to has not been validated. It was developed with consideration of watersheds on North Kuiu Island that included a range of timber harvest as given in the reference mentioned. The TLMP Revision utilized a different data set to establish a standard harvest limit for all 3rd order and larger watersheds. The model utilized for this analysis applies harvest limits to individual watersheds utilizing site specific data that reflect some of the

physical characteristics of each watershed, and a quantitative (from ADF&G data) index of the beneficial uses of streams contained therein (ie. fish). This sale would harvest about 13% of the Hollywood Creek watershed (Unit 20) and 41% of the unnamed watershed to the east of Frank Creek. Other 3rd order watersheds are harvested at a much lower percentage (0 to 5%). As no other entries are planned for about 150 years, cumulative harvest effects on watersheds are expected to be minimal.

Log structures in first and second order streams were not proposed, but listed only as potential enhancement projects. As project proposals, these would require separate NEPA documentation. Please refer to page 3 for discussion of Class III stream protection. We agree that log structures are inappropriate as a sole method to restore watershed health where a degraded condition exists.

Thank you again for your comments regarding the Campbell DEIS. We look forward to continuing the dialogue with the EPA regarding the permitting of the log transfer activities and other issues regarding this sale, as well as future projects planned on the Stikine Area.



Abigail Kimbell
Stikine Area Forest Supervisor



ADOPTED AUGUST 1972

CITY of WRANGELL, ALASKA

INCORPORATED JUNE 15, 1903

BOX 531, 99929 (907) 874-2381
FAX: (907) 874-3952

July 13, 1993

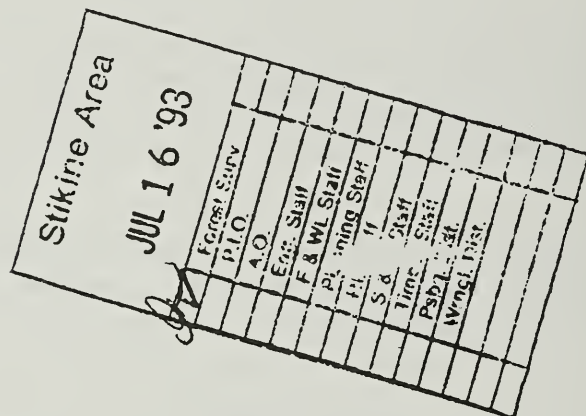
Abigail Kimbell
Forest Supervisor
Tongass National Forest
Stikine Area
Box 309
Petersburg, AK 99833

Dear Ms. Kimbell:

Thank you for the opportunity to comment on the Campbell Draft EIS. The City of Wrangell has undertaken a significant effort toward an overall economic development plan (Economic Development Action Plan). Among its goals is to minimize the impact of boom and bust cycles in the forest and fishing industries. The plan is ambitious and seeks in a variety of ways to diversify and strengthen Wrangell's economy.

The plan also notes that economic development efforts must not ignore existing businesses. Rather, these efforts must sustain and enhance the existing economy. The plan, and supporting studies, confirms that Wrangell's economic health is directly related to the economic health of APC's sawmill which provides 200 direct jobs in Wrangell.

On page 48 of Chapter 4 of the EIS, the discussion of rural area development notes "If economic value is important, Alternatives F and D have the most positive timber economic values while maintaining some of the existing and potential guided tourism values of the Tom Creek area." The Wrangell Economic Development Action Plan leaves little doubt that economic value is important. The adverse economic impact on Wrangell of choosing an alternative which delivers less economic return should be clearly identified and carefully weighed especially in light of USFS responsibilities



CITY OF WRANGELL, ALASKA

Abigail Kimbell
July 13, 1993
Page 2

for implementing the "Rural Revitalization through Forestry" subtitle of the 1990 "Farm Bill". Alternative D appears to maximize economic benefit to Wrangell while not precluding other economic development options.

Sincerely,

Duane H. Gasaway
Duane H. Gasaway
City Manager

DHG:fv

cc: Mayor and City Council

United States
Department of
Agriculture

Forest
Service

Alaska Region Tongass National Forest
Stikine Area
P.O. Box 309
Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

Duane H. Gasaway
City of Wrangell
P.O. Box 531
Wrangell, Alaska 99929

Dear Mr. Gasaway,

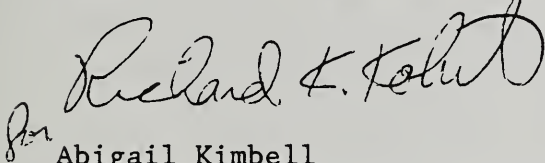
Thank you for your comments on the Campbell Timber Sale DEIS. I would like to take this opportunity to respond to your comments. Your letter and this response will be published in the FEIS.

We support Wrangell's continuing economic development efforts through our participation in the Wrangell 2001 effort and representation on the Economic Development Action Team. We believe as you do that it only makes sense to maintain or enhance a community's existing businesses while developing and diversifying other sectors of the economy. Part of the challenge in the timber industry is finding new methods to log while maintaining many of the other resource values. The Campbell Timber Sale experiments with new methods of harvest. If successful, these methods may be able to be used in similar situations where there is difficult terrain and high aesthetic and biological values. We have much of this type of country nearby Wrangell. Creative approaches will be needed if the timber industry is to remain healthy in the future.

The selected alternative (Alternative P) for the Campbell Timber Sale was constructed based on comments on the DEIS, such as yours. I concur that Alternative D has some attractive features. The selected alternative combines the best features of DEIS Alternatives D and F. Alternative P develops less infrastructure like Alternative D but harvests 1.1 MMBF more. Although the mid-market assessment is lower than Alternative D or F this does not necessarily mean there is less economic return to the community under Alternative P. The mid-market assessment only factors in the stumpage value of the particular sale and does not take into consideration other factors such as timber supply, jobs and the future productivity of the project area which are also important considerations for Wrangell. Alternative P does make some sacrifices to short-term economics but I was concerned that under Alternative D, some areas capable of producing timber now and in the future would never be economically feasible to log unless they were harvested this entry, while the helicopter was mobilized in the area.

Alternative P is also designed to reduce impacts to the marine environment, wildlife and aesthetics of the Bradfield area which are also part of Wrangell's economic base and quality of life. I believe that Alternative P provides for the best mix of resource and ecosystem values because the impacts to the environment are less (similar to Alternative D), while still resulting in an economic offering at a mid-market level and harvesting approximately 11.6 MMBF.

Again, thank you for your comments and suggestions regarding this sale. We look forward to continued interactions with the City of Wrangell on projects and support to your economic development initiatives.

A handwritten signature in dark ink, appearing to read "Richard K. Kimbell". The signature is fluid and cursive, with a large, stylized initial "R".

Abigail Kimbell
Stikine Area Forest Supervisor

Wrangell Resource Council

P. O. Box 2073
Wrangell, Alaska 99929
(907) 874-~~3304~~ 3241

Dear Meg:

Thanks for the opportunity to comment on the Cambell Timber Sale DEIS. We also appreciate the openness and effort to include the public (esp. those of us without phones!) and other agencies in the NEPA process from the very beginning. This cooperative spirit and friendliness is unprecedented in our dealings with the Forest Service.

Forest Service research is showing that traditional forestry conclusions that Tongass old-growth forest ecosystems are unproductive, decadent, over-mature, and homogeneous are false. In addition, the adage that clearcutting is necessary to achieve desired second-growth stand characteristics is also being challenged.

Therefore, we are pleased that the Forest Service is beginning to seriously consider harvest methods other than clearcutting which should be much less destructive to old-growth forest characteristics. We also appreciate your admission that these methods are experimental and therefore looked at impacts as if they were clearcuts in the DEIS. We were pleased to find plans for monitoring these units in the DEIS, though plans and funding for essential long-term monitoring do not seem assured. The ecological, aesthetic, and economic results of these sales should be monitored and assessed, then disseminated to the public in the form of a report or reports.

We were also glad to see helicopter logging as the preferred harvest method, as that eliminates the need for roads and LTF's. And we were relieved to find that the preferred alternative stays out of the more sensitive Tom Creek drainage.

to encourage
While we want a positive change within the Forest Service, there are several issues regarding this sale that concern us greatly:

1. SCOPING WAS DONE FOR A MUCH SMALLER VOLUME SALE THAN APPEARS IN THE DEIS ALTERNATIVES: The proposed action section of the scoping document states that approximately 8 mmbf of timber will be harvested. In a meeting with you on 10/9/92 we were told that there were 5 action alternatives ranging from 4.4 mmbf to 12 mmbf. However, in the DEIS the action alternatives range from a low of 8.8 mmbf harvested from 383 acres to a high of 22.1 mmbf harvested from 1007 acres, the preferred alternative having 15.9 mmbf from 701 acres harvested. The high alternative in DEIS is nearly 3 times, and the preferred nearly twice as large a sale as the amount suggested in the scoping document.

Obviously, a sale 2 to 3 times as large is going to have correspondingly larger impacts and environmental effects regardless of the reasons for the increase. While the issues raised in a smaller sale may be essentially the same as a large sale -- the magnitude of concern will be greater for issues such as visual quality, fish and wildlife, effects on tourism and recreation -- in fact, some large sale concerns may not be significant issues in a smaller sale.

The Council on Environmental Quality's "Forty most asked Questions concerning CEQ's NEPA regulations" states the regarding scoping that there must be, "enough information available on proposal so that the public and relevant agencies can participate effectively". CEQ regulation 1501.7 Scoping states that, "there shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues to be addressed and for identifying the significant issues related to a proposed action."

2. DEIS APPEARS TO BE AHEAD OF CULTURAL FIELD INVENTORY:

While the cultural resources section was better than average for a Forest Service document, there was no mention of the remains of a village discovered in the area this spring. Nor could we find mention of the numerous fish trap remains common in the intertidal zone of the sale area and discussion of how the proposed LTF's will impact them.

All field work should be completed so it can be included in the DEIS.

3. STATE CONCERN NOT ADDRESSED:

Though we commend your cooperation and inclusion of state and other agencies in the planning process, we are disappointed to find that you didn't heed ADF&G's warning concerning the road alongside Franks Creek in the preferred alternative. In a letter to F.S. dated Sept. 18, 1992, ADF&G Habitat biologist Don Cornelius states, "The (F.S.) engineering staff were inspecting a sand embankment which would be crossed by one of the possible roads several hundred feet from Franks Creek. Our experience with sand is that once it is exposed these slopes are extremely difficult and expensive to stabilize. Sand deposited in streambeds is very detrimental to spawning and rearing habitat. In selecting road locations we request the Forest Service make avoidance of sand deposits (where there is any chance of the sand entering surface waters) a very high priority." He goes on to recount his experience with a similar road in Hobart Bay that cost a million dollars a mile to fix and still is dumping sediment into the salmon stream below (doubtless there are similar examples from harvest roads on the E. Bradfield river as well). Since this is^a helicopter sale anyway, this road should not be built.

In scoping comments regarding brown bear populations in the area the state requested that "mitigation including firearm restrictions and hunting closures need to be included in the analysis." The State also suggest that "completion of plan to prevent logging related impacts to brown bears would be worthwhile addition to the EIS. This plan should deal with issues including the management of hunting pressure, increased road access, defence of life and property, use of helicopters and other and other air traffic, and camp waste disposal." Concern for brown bear in the area was a common concern among many groups and individuals as well. While the DEIS does mention the possibility of a hunting closure as a mitigation measure it doesn't commit to anything and is a far cry from the plan requested by the state.

4. ECONOMIC IMPACT ON TOURISM NOT ADDRESSED:

Though the DEIS admits on p. 3-33 that applications for outfitter guide permits in the Bradfield Canal area has increased over 100% in 1993 over 1992, it fails to assess the current dollar value in outfitter guide revenues and predict the projects impact on possible growth or future revenues. As one charter operator commented in scoping reagarding this sale, "very few "pristine " areas are left. All it takes is one cut in a view shed. This affects marketability of the area for outfitter and guides." Tourism is the fastest growing segment of the Alaskan economy and should be given full consideration.

5. DESPITE THE BEST INTENTIONS ON THE DISTRICT LEVEL TRUE ECOSYSTEM MANAGEMENT IS IMPOSSIBLE IN A REGIONWIDE CONTEXT:

SEACC executive director John Sisk wrote the following comments regarding the Alaska regions ecosystem management strategy, "You cannot have "Ecosystem management" as long as you have "managemant by timber target" The two are antithetical. Yet the TLMF Revision is clearly "ASQ driven" and month to month management is "Senator -driven". Or, at the very least, "[pulp timber] contract driven." To practice ecosystem management you must free the agency and the Tongass from central timber planning in Washington, from statutory cutting directives in the form of annual appropriations legislation, and from the long-term timber contracts that still drive Tongass management."

In short, as long as "getting the cut out" is the bottom line, everything else: ecosystems; public concerns; other industries -- are secondary. In fact, if "ecosystem management" instead of "timber target fullfillmant" were the guiding principle on the Tongass, this steep-sloped, unstable soil, wildlife-rich would probably be excluded from large-scale logging operations.

Nevertheless, we applaud your efforts to move beyond the the status quo on the Tongass and appreciate the difficulties you face trying to affect change from the lower ranks of a rigid bureaucracy.

WHAT WE WOULD LIKE TO SEE IN THE FINAL EIS:

1. GENUINE CONSIDERATION OF A NO ACTION ALTERNATIVE:

In a list of pre-DEIS alternative strategies you had two no-action alternatives with discussion on its reasons and merits, ie: defer until harvest economics or technologies improve: economic analysis will show difficulties; amend TLMF to remove from development -- best uses for the area are non-developmental in nature. You should expand on those other "best uses": tourism, recreation, subsistence, fisheries, etc. However, in the DEIS the no action alternative is reduced to the usual obligatory statement required by NEPA.

2. NO ROAD OR LTF:

Both are of great risk and possible impact and are unnecessary in a helicopter sale.

3. DELETION OF UNITS CONTAINING HIGH-VALUE WILDLIFE & FISH HABITAT:

Specifically goat winter range of concern to ADF&G and sandy-soiled unit 10, as well as high-value habitat in unit 13 and 14.

4. HUNTING AND FISHING CLOSURE IN THE AREA DURING THE SALE:

As part of a detailed mitigation plan this should include provisions for enforcement. This idea has several precedents in Southeast: Greens Creek on Admiralty Is. and Frosty Bay on the Cleveland Peninsula.

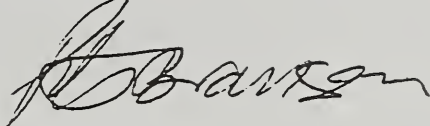
5. ECONOMIC IMPACTS AND MITIGATION FOR PRESENT AND PROJECTED TOURISM AND OUTFITTER GUIDES IN AREA:

Tourism is the only "growth industry" Alaska has got and should be given serious consideration. As Representative George Miller stated on the House floor regarding the just passed Tongass Timber Reform Act: "This bill requires the Forest Service to meet the needs of resource based industries other than timber -- including commercial fishing, sport hunting, sport fishing, and tourism -- and provide for non-commodity uses of forest resources for subsistence and recreation ... The era of preferential treatment of a single commodity, timber, is over."

Thank you very much for your consideration. We look forward to continue

our participation in this sale.

Sincerely,

A handwritten signature in dark ink, appearing to read "P. Branson". The signature is fluid and cursive, with a large initial "P" and a long, sweeping underline.

Peter Branson

for Wrangell Resource Council

cc: SEACC

Narrows Conservation Coalition

United States
Department of
Agriculture

Forest
Service

Alaska Region Tongass National Forest
Stikine Area
P.O. Box 309
Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

Peter Branson
Wrangell Resource Council
P.O. Box 2073
Wrangell, Alaska 99929

Dear Mr. Branson,

Thank you for your comments on the Campbell DEIS which we considered with others in producing the Final EIS and making the decision on the proposed Campbell Timber Sale. I would like to take this opportunity to respond to your comments. My response will follow the main points in your letter. Your letter and this response will be printed in the FEIS, Appendix C. The format of my response follows the sequence of points in your letter.

We also found our dialogue with you and your organization to be more effective by communicating early and throughout the planning process. Involvement of the public and organizations such as the Wrangell Resource Council help us focus on the critical issues from which a quality range of alternatives eventually grows. We are also appreciative of the initiative you took to meet with us periodically and hope you will continue to do so in the future.

We agree that the experimental harvest methods called for in the FEIS are important to monitor over the long-term. However, you are correct in stating that funding for this is not assured, especially over the long-term. I prefer to state our assumptions and limitations up-front instead of making definite commitments. We will continue to investigate creative ways of accomplishing our monitoring commitments. If you or your organization are interested in assisting us with the monitoring of the Campbell Sale please contact us.

1. We understand your concern for the volume in the range of alternatives but disagree that this invalidates our scoping and public involvement. A proposed action is only one alternative to begin the planning process under NEPA and is usually derived before full analysis and public involvement. It is simply a starting point and the sale volume is simply one of the descriptors. Alternatives to the proposed action that satisfy the purpose and need are also examined under NEPA. Additionally, a "proposed action" is not the same as a "preferred action" under NEPA. The scoping document to which you refer clearly

states that the proposal to harvest 8 MMBF is "simply a starting point for the planning process" and "other alternatives which meet the Forest Supervisors objectives will also be considered."

The objective for any NEPA analysis is established in purpose and need statement. In this case the purpose and need was identified as "to consider specific alternatives to harvest timber within the project area given the guidance in the Tongass Land Management Plan." In this case I was interested in examining the capability of the area to support timber harvest and exploring different approaches that might arise from an "ecosystems look" at the project area. Accordingly, it was appropriate to develop a range of alternatives that resulted in different harvest levels.

However, there were several changes between the Draft and Final EIS which reduced the predicted volumes of all alternatives. More field reconnaissance revealed that two of the units were infeasible and there were some changes in harvest prescriptions and sizes. The volumes in the FEIS now range from 7 MMBF to 20.5 MMBF. The alternative with the most harvest (Alternative E) is very important to the range of alternatives because it shows me the effects of harvesting in Tom Creek and the maximum harvest achievable. The selected alternative (Alternative P) harvests 11.6 MMBF and was specifically formulated from public comment.

2. I should have sufficient information about the nature of cultural resources in the project area prior to signing the Record of Decision. As of August 7, 1993 we completed the Section 106 process for the Campbell Timber Sale which calls for final concurrence with the State Historic Preservation Officer. This more than adequately meets both NEPA and National Historic Preservation Act requirements. Prior to the issuance of the DEIS, we received concurrence from the State Historic Preservation Officer on the methods and inventory strategy. Also, 781 acres of the total 1,110 acres (70%) of high probability area had been surveyed prior to the issuance of the Draft. Although it may be optimal to have all the cultural resource field work done prior to the Draft, this is not required nor is it feasible due to changes which often occur between DEIS and FEIS. The cultural resource section under Chapter 4, Issue 8 has been revised in the FEIS. However, we can not disclose the actual locations of these sites in the document. All the potential Log Transfer Facility sites were surveyed since they occur within the high probability zone. None have any effects on cultural or historic resources including fish weirs.

3. In the selected alternative (Alternative P) this road will not be constructed. For the development of other alternatives, we did heed ADF&G's warning in addition to our own early concerns about the road up the Frank Creek watershed. Road engineers, a hydrologist and a soil scientist conducted field investigations of the road location. The final road design in Alternatives B, E, F and G minimizes construction on sand and blue clay. Most of the road length is located on muskegs adjacent to Frank Creek. There is one short section of road which is located on a steep bank. The bulkwork and construction measures would be effective in preventing sloughing. Road may still be necessary even with helicopter yarding in order to shorten distances for yarding by helicopter. This is the case with Alternatives B, E, F and G.

It is not possible for me to commit to closing a hunting season, however, I can recommend that they be closed. Hunting closures are the responsibility of the Federal Subsistence Board and the State Department of Fish and Game. In a relatively new development since the federal take-over of subsistence management, the Federal Subsistence Board has control over hunting on federal lands. Any person or agency can submit a proposal to the Board to close an area to hunting but there is no guarantee that the Board will act favorably on the proposal. Therefore, as part of the decision on this sale, I am willing to submit a proposal to the Federal Subsistence Board to close the harvest area to brown bear hunting during the harvest operation. If the State is concerned, they can close the non-subsistence hunting season. Also, the selected alternative does not build roads, even further mitigating the potential conflicts between brown bears and logging personnel. All the State's concerns have been adequately responded to.

At the Green's Creek Mine example cited in your letter, the Forest Service included contract provisions which did not allow mine employees to use company equipment to hunt and fish (the mine was located far inland). This same measure could be implemented at Campbell but would not be effective since employees could easily bring their own personal transportation with little cost (this was not the case at Green's Creek). Such measures are more effective in remote areas. In the Campbell sale area, under the selected alternative, helicopters could not be used for hunting.

4. A economic impact analysis was conducted for the Campbell Timber Sale and is included in the FEIS, in Chapter 4. This assessment is limited by the assumptions which are also disclosed. Accurate, site-specific information is limited and there is disagreement among outfitters and guides using the area about the impacts of harvest on the experience of their clients. There is a high degree of variability in the expectations of the clients toward the visibility of harvest. Therefore, we took the approach of modeling a "worst case scenario." I believe that the actual impacts to outfitting and guiding will be much less.

5. We believe that in some landscapes we need to change our thinking about what constitutes "timber production." This area makes a good test case for "unconventional" methods of timber harvest. We face entry into many areas with equally difficult terrain and circumstances as the Campbell project area. At the same time, we face a tremendous challenge to supply a growing national demand for jobs and wood fiber while at the same time managing ecosystems for aesthetic, wildlife and fishery values. I believe we have met that challenge in the Campbell project area and perhaps we may learn something to apply to other equally difficult landscapes in the process. For these reasons, I chose Alternative P, an action alternative.

RECOMMENDED CHANGES IN THE FINAL EIS:

1. We have expanded on the benefits associated with the no action alternative. In particular the Alternative Comparison Chart in Chapter 2 has been revised in the FEIS.

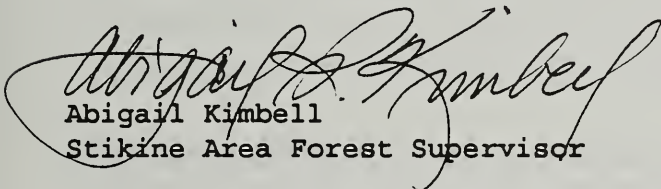
2. The selected alternative contains no road. One LTF is planned on the West Face.

3. The selected alternative drops units #1, #2 and the west half of unit #3 to reserve a block of high value goat winter range. Units #11 and #13 were dropped in all alternatives after field reconnaissance determined these units were unsuitable for timber production. Unit #14 was dropped in the selected alternative because part of the unit has valuable goose habitat and the remaining portion was too far for the helicopter to land when we dropped the road.

4. I will make a recommendation to the Federal Subsistence Board to close the logging area to brown bear hunting during sale operations because this species has the most potential to be affected by the increased presence of personnel. I see no justification to close the area to all species or fishing.

5. An economic analysis of the "worst-case" scenario on outfitting and guiding activities was included in the FEIS. Overstory removal harvest techniques are proposed in order to respond to the use of the area by recreationists. Dropping the development of the LTF at Frank Creek in the selected alternative will also decrease the effects of the sale on scenic quality.

Again, I would like to thank you for your thoughtful comments and involvement in the Campbell Timber Sale planning effort. The involvement of the public is important to our efforts to continue to learn about and manage ecosystems.



Abigail Kimbell
Stikine Area Forest Supervisor



NARROWS CONSERVATION COALITION

P.O. Box 1331, Petersburg, Ak. 99833

July 14, 1993

Meg Mitchell
U.S. Forest Service
P.O. Box 51
Wrangell, Ak. 99929

RECEIVED
JUL 14 1993
STIKINE AREA
TONGASS NATIONAL FOREST

re: Campbell Timber Sale

Dear Meg:

These comments are submitted by Narrows Conservation Coalition for the Campbell Timber Sale Draft Environmental Impact Statement (DEIS). We are particularly interested in this sale since it represents one of a series of proposed highly intrusive mainland timber sales. We request that these and all public comments be printed in the Final EIS (FEIS) and that each and every concern expressed and question asked in those letters be specifically answered in the document, in a section set aside for that purpose.

General Comments:

Once again we must protest the release of a document at the height of the fishing and work season for most Southeast Alaskans. Persons for whom your actions most affect will be unable to comment due to the demands of their work related and subsistence gathering demands.

While this timber sale has a much better potential to win approval from a larger segment of the public than any previous, we feel that due to its location on this particularly sensitive mainland area it may well be doomed to failure. Your agency would probably find more acceptance if it were proposed in an area less rich in wildlife, fisheries, and cultural resources, and that harvested timber and built roads on less hazardous soil resources.

The Campbell scoping notice stated that the ecological approach using "New Perspectives" principles would be incorporated into this planning process. Because solicitation of public comments and including the public "up front" is a major component of these principals we were optimistic that such an approach would be the guiding force in the planning process for this sale.

Sometime during the sixteen months since the scoping notice the planning process got off track. The end result is a document that sacrificed every resource in the area

other than timber. This EIS simply represents a new way to say an old paradigm - that "timber is king." Merely creating a new document format does not constitute ecosystem management. We urge you to get back on track by issuing a supplemental document and thus avoiding a challenge to an improperly prepared plan. Until such time that a new plan can be developed we support the "no action" alternative and refer you specifically to the following inadequacies of this sale.

Purpose and Need

We are still unclear who this timber sale is intended for. Is this an independent timber sale? KPC has been awarded four timber sales previously designated for the independent sale program: Starfish (44 mmbf), Frosty Bay, (26 mmbf), Shelter Cove I (approximately 20 mmbf), and 12 Mile (? mmbf). Together these sales represent more than 100 mmbf currently available timber. We doubt there is any demand for timber by independent operators. There is a high likelihood of this sale ending up in the hands of a long term contract holder, or a large corporation such as Weyerhaeuser, KPC, or one of its subsidiaries.

The "need," according to the DEIS (at 1-3), for harvesting timber and managing future timber production is to provide wood products and the opportunity for jobs. If this timber sale were intended for independent operators to supply wood, then why have four timber sales recently gone to the long term contract holders? And if providing jobs is a major consideration then the true loss of jobs and economic opportunity for users of resources other than timber should be given more than cursory consideration and specifically quantified in your document.

Proposed Action:

The original scoping notice for this timber sale stated that the "proposed action" was to harvest approximately 8 mmbf of timber. We were disappointed to see that action alternatives offered in your document range from 8.8 mmbf to 22.1 mmbf and represent 110 % to 276 % of the original proposed action. The preferred alternative proposes harvesting 15.9 mmbf - nearly double that of the proposed action! Was a subsequent scoping notice with a new targeted harvest volume distributed to the public which we may have perhaps missed? We do not believe the FS has the authority to change targeted volumes so dramatically without public input.

We do not recognize the project presented in the DEIS as the same one proposed in the March 18, 1992 scoping notice. Significant issues arise when the proposed action for a particular project changes as dramatically as this particular one did. Not only will interested and affected publics be impacted to a greater degree but the environment in which this activity occurs will be dramatically altered from the original proposal. The public was led to believe one thing and your agency is proposing something entirely different. For instance:

1. Individuals and organizations that perceived this project to be seemingly innocuous

because of the low harvest volume may not have responded to the scoping notice. They now may be very surprised that proposed harvest volumes depart so dramatically from the original proposed action. The public must have an opportunity to be included "up front" to raise issues and concerns on the real proposed action.

2. Issues identified from the scoping process are different from those inferred in your proposed action. A preferred alternative that doubles the harvest also generally doubles (at least) the impact of your sale on various resources. DEIS Table 2-11 and 2-13 which illustrate alternative characteristics and issue comparison, reveals dramatic differences between alternatives that harvest 8.8 mmbf and 22.1 mmbf. For instance, about 2.6 times the acres will be harvested, 2.5 times the volume, 3.5 times the miles of road built, 3 times the LTF sites, 2 times the number of miles of streamside harvest, 2.4 times more stream crossings, 12.6 times forested wetland harvested, 2.9 times the harvest in high hazard soils, 4.4 times the number of riparian acres harvested, 4.4 more high probability cultural areas harvested, and unquantified additional impacts to recreational users, etc.

3. The decision to increase the proposed action volume was made outside of the NEPA process in response to industry, because they felt that 8 mmbf "was not sufficient to justify the expensive helicopter systems necessary to log the sale." (DEIS at 2-2). The Campbell Planning Team developed a preliminary range of alternatives and then "showed them to several persons inside and outside the Forest Service," which presumably helped the planning team find out if they "were on the right track." (DEIS at 2-2). Who were these individuals? This does not constitute full public disclosure of proposed actions if only select individuals are able to review such plans. Such actions are particularly disheartening since Narrows Conservation Coalition specifically requested that we receive regular written updates on the planning process.

The Campbell planning team responded to industry requests by "incorporating several alternatives that log more than 8 mmbf and attempted to make the sale as economical as possible given the *strategy of each alternative*." (DEIS at 2-2) [emphasis added]. It appears the strategy of each alternative was to maximize the harvest of timber, with other considerations secondary.

We find it incongruous that your agency responds to industry demands so readily, yet many interested individuals and organizations are on record in their comments to the TLMP SDEIS and for the Campbell Sale that this area should not now or in the future support timber harvest. Your predictable response is that "the current Forest Plan direction allocates this area to a LUD IV designation," (DEIS at 1-13) so unless the no action alternative is chosen the only choice is to harvest between 110 % to 276% of the proposed volume. We are however reminded in your document that "the ecosystem management concept is also broad enough to include man's stewardship of the land for reasons that do not directly benefit people." (DEIS at 1-3). If this planning process truly incorporated the ecosystem approach, then shouldn't alternatives that harvest 25% or 50% of the proposed action be included?

The document indicated that "an alternative to change the allocation to a LUD II or LUD III could have been considered by the Regional Forester as part of this project level analysis." (DEIS at 1-13) Did the IDT present Mr. Barton with such a proposal and if so what was the response?

As we review this document we tried to keep in mind that this is the ecological approach yet we constantly fail to see the connection.

Log Transfer Facilities:

We were disappointed that two LTF sites were proposed under the preferred alternative and 3 sites were proposed for Alternative E ! Although the West site was not identified on any maps in the DEIS, (and made interpreting the document very difficult) it appears that the distance between the 3 proposed sites is only 1 1/2 to 2 miles. We believe that the adverse impacts of just one LTF in a bay is rarely justified, not to mention two or even three.

Bark deposition, toxic leachates from bark residue, sewage disposal problems, etc. will all have great impacts on shellfish and finfish that inhabit and transit the area. These adverse effects represent long term Irretrievable Commitment of Resources and should be recognized as such. The claim is made that the LTF sites will be rehabilitated. (DEIS at 4-11). Rehabilitation measures cited in the DEIS apply only to upland areas. How will the intertidal and subtidal areas be rehabilitated?

From the information presented in this document we do not believe the Bradfield Canal can support any LTF. The claim is made at the beginning of the document that "Facilities will be located away from areas which provide important habitats for marine life. (DEIS at 1-6). Yet elsewhere it concedes that all three sites intrude on important habitats for marine life.

"Of the three sites, the Frank Creek site (common to most action alternatives) would present the greatest risk to biological productivity and would create the most displacement of commercial shellfish operations." (DEIS at 4-13).

The West Site is located on the westerly edge of an intensively used commercial shellfishing area." (DEIS at 4-13).

"Small numbers of harlequin ducks were commonly seen in the nearshore water within 1/2 mile of the Tom Creek estuary." (DEIS at 3-41). (This statement should be in the DEIS paragraph (at 3-41) on "Estuaries" not in "Offshore Areas")

The DEIS acknowledges that none of the recommended sites meet all the siting requirements developed by the Alaska Timber Task Force. (DEIS at 4-13 and 4-53). All three sites are too close to Class I or II streams and do not have a 5 acre minimum

of weather protected waters. The West and Frank Creek LTF sites are additionally too close to shallow productive habitats, do not meet minimum depth requirements, do not avoid small craft anchorages, and do not minimize effects of earthquakes. (DEIS at 4-13, 14).

There is a short discussion in the DEIS (at 4-15) concerning two barge options the potential operator may employ to facilitate operations. There are a number of questions that arise from such a proposal to the extent that a separate alternative should be developed for these "options". For instance, simplistic statements about the amount of debris floating in the canal, and "debris dispersing with the current," the amount of logs potentially dropped into salt water, hazards to small boats, and the impacts from barge traffic in Bradfield Canal need to be more rigorously explored and quantified. The public must be informed of the consequences of a proposed action before it is approved.

High Value Goat Habitat:

We requested in our scoping comments that all timber harvest activities come no closer than 1/2 mile from cliff areas used by mountain goats. This was a reasonable request considering that these areas include some of the most valuable goat habitat. We were disappointed that numerous cutting units ("relatively level sites above cliffs where goats rest and feed..."), (DEIS at 4-22) were located in this high value habitat. We once again request that you delete any units that infringe on goat winter and summer range, ie. Units 1,2, 3, 4, 5, 6, 7, 8, and 13, etc.. While we believe that proposed mitigation measures such as timing restrictions, distance restrictions for helicopter activity, etc. can minimize impacts, we do not believe that **any** cutting near these cliff areas can be adequately mitigated.

Marbled Murrelet and Queen Charlotte Goshawk:

The DEIS does not meet NEPA requirements to conduct a detailed and thorough assessment of the impacts of the proposed logging and road building on wildlife. In particular, the DEIS fails to completely assess impacts to two species of concern on the Tongass - the Queen Charlotte Goshawk and the Marbled Murrelet.

In describing Alternatives, the DEIS (at 2-22) acknowledges that they are likely to be present in the project area and what measures will be implemented if nests are found. For the Goshawk, the DEIS recognizes that the species is uncommon on the Tongass and is being considered for addition to the Region's Sensitive Species List. The DEIS says only that both species are found in the area, no nest sites have been found and, that if nests happen to be found in the future, steps will be taken to protect nest sites.

There is *minimal* analysis of impacts. The DEIS (at 4-17) section which describes the impacts of the alternatives on the environment generally discusses impacts to these two species of concern: "The most likely potential effects would be loss of nesting habitat for goshawks and marbled murrelets." The Forest Service mitigation efforts for

the above species reflect a lackadaisical attitude of "if someone finds a nest or presence of a sensitive species while road building or cutting, we'll document it and mitigate for it then." This is an unacceptable way to prevent and avoid "significant impacts" on wildlife resources in the project area and surrounding VCU's. Mitigation measures suggested such as retaining old growth for wildlife habitat are nullified for these species due to fragmentation.

In addition to its minimal assessment of the potential impacts of logging activities on the habitat needs of these species, the DEIS is flawed for failure to assess site-specific impacts of this project. The U.S. Fish and Wildlife Service, among others, have specifically emphasized the need for the Forest Service to conduct surveys of the project area for these species before completion of the FEIS. Will these surveys be completed as required?

Even more disturbing is the fact that the interim guidelines identified in the DEIS (at 2-22, and 4-17) are proposed without any credible scientific information to support them. ADFG and the FWS have strongly criticized the interim guidelines for the goshawk. FWS has stated that the guidelines will not protect nesting goshawk pairs or viable populations of goshawks. Expert agencies have also told the Forest Service, unless surveys are **properly done, at the right time of year, by expert biologists**, it is very likely that most goshawk and murrelet nests will not be found.

Noticeably absent from your document is incorporation of the Interagency Viable Population Committee Recommendations. This wildlife conservation strategy has been reviewed and praised by Jerry Franklin (the "father" of the ecosystem approach) and Dr. Bruce Marcot, the latter in a recent official review of this strategy for Region 10. The absence of *any mention* of this outstanding piece of conservation work only further discredits this document and its so-called ecosystem approach. It was done by your own employees and you should embrace it. It's not too late to incorporate these recommendations and perhaps win approval from ADFG, FWS, and the public for management of old growth dependent species such as deer, brown bear, mountain goat etc..

Brown Bear Habitat:

Five units (9, 10, 11, 12, 14, and 15) infringe high value brown bear habitat near Frank's Creek. Cutting of these units will significantly affect brown bear habitat and distribution and we request that these units be deleted from this sale.

Utilization Standards:

If the ecosystem approach were really incorporated into this sale there would be no artificial size limits on leave trees within cutting units. Size of leave trees should depend on wildlife requirements particularly related to structural diversity, snow interception, etc.. How does the removal of 12" or 16" trees achieve real structural diversity? Shouldn't there be a concerted effort to retain trees of much larger

diameters?

Ecological Zones:

Ecological zones as defined in the DEIS are not based on scientific criteria. Most notable is the "Saltwater Influence Zone" which is defined as an area influenced by saltwater from mean higher, high tide to 500 feet or 1000 feet from estuaries. (DEIS at 1-8). This zone coincides exactly with the TLMP definition of beach and estuary fringe. Likewise the "Freshwater Influence Zone" is partially defined in terms of politically mandated TTRA 100 foot buffers. The "Upland Saltwater-Facing Zone" by definition faces the Bradfield Canal and is seen by visitors to the area." (DEIS at 3-58). Aspect in relation to human viewers was the driving force behind this delineation.

Although we try to keep in mind that this is an ecological approach we are unconvinced that this approach played any role in development of alternatives. For instance, from comparison of the maps for productive forestland and volume classes it appears that cutting units are located almost exactly in the productive forestland boundaries and higher volume classes irrespective of the ecological zone. The same can be said for cutting units located in high value goat, deer, and brown bear habitat .

Estuaries:

According to the Alaska Timber Task Force the West Site LTF is too close to shallow productive habitats (extensive tideflats, salt marshes, kelp / eelgrass beds, seaweed harvest areas, shellfish concentration areas). (DEIS at 4-14). The definition of estuary as defined in the DEIS (at 3-41 and glossary) coincides with this area. Although the West Site LTF was not identified on any maps it appears that this site is located just below Unit # 6. This particular unit is 500 feet from the estuary, not the required 1000 foot estuarine buffer.

Fisheries and Stream Crossings:

According to the document there are 5 stream crossings required for the Frank Creek road. Unit Plans 18 and 19 are of an adequate scale to depict the full length of this road, however only one Class I stream crossing is apparent. Where are the rest? What class are they? The Planned Road Card for this road is not of sufficient scale to depict stream crossings but mentions that minimum 36 " CMP's are required. Are these crossings over spawning habitat? If so, open bottom structures are required.

A Class III stream within the Unit 6 flows directly into an unnamed Class I stream directly below the unit. According to the unit plan description there are no fisheries concerns for this unit, however there are fishery concerns for an area just below the unit. The Unit Plan prescription says "provide protection under section c of the timber sale contract for Class III streams." Does this refer to Best Management Practices?

It appears that this unit will be located on moderate hazard soils. Shouldn't there be

more than the statutory requirement to apply BMP's? How about a windfirm buffer to protect downstream water quality? This is particularly important since the Forest Service has not adequately monitored the effectiveness of these management practices. In past timber sales these practices have been almost wholly ignored leaving the fragile stream systems at the mercy of the logging industry. (Similar problems exist for other DEIS units, ie., #'s 9, 12, 13, 14, 16, 20, 28).

Inland Wetland Habitat:

We were disappointed that the 500 buffers required under the definition of "inland wetland habitat" (DEIS glossary) were not reflected in the text, unit cards, and maps in the document. We were also disappointed that timing restrictions were not included as mitigation measures for timber harvest near important goose habitat. Because sedge and grass meadows were repeatedly referred to in the document (ie, DEIS at 4-11) we suggest including mapped identification of these areas. We would like to see all lakes name identified (if they have a name) on Unit Plan maps and other appropriate places in the document.

The DEIS (at 3-58) acknowledges, "Groups of geese were consistently seen at Campbell Lake, Tom Lake, and the lake east of Tom Creek estuary. Campbell Lake in particular seems important for molting geese." However these concerns were not reflected in unit plans 34, 35, and 36. Other unit plans included simplistic statements such as "provide for goose habitat." Exactly how goose habitat will be provided for is unclear. Cutting of portions or all of these units will likely have impacts on goose populations. Unit 36 depicts cutting boundaries right up to the lake shore.

Since the Vancouver Canada Goose is a sensitive species shouldn't there be timing restrictions imposed similar to those included in the DEIS for other sensitive species such as mountain goat ?

Extended Rotation:

The DEIS claims that "no more than 2 or 3 timber harvest entries are foreseen within an extended rotation of 120-150 years." (DEIS at 1-5). What is this approach trying to achieve with the extra 20 to 50 rotation years? If this timber sale approach were truly ecosystem management the forest should be have extended rotations of 300-400 years to achieve sustainable old growth conditions?

Recreation and Visual Quality:

Your agency has failed to address more than just cursory potential impacts to recreation users, particularly those of outfitter guides and potential wildlife viewing facilities. This area includes the "last untouched shorelines" in the area. The Anan Creek bear viewing facility is overflowing at the brim and similar nearby potential should be tapped. The Harding / Tom Creek area is a logical choice. Timber harvest activities may foreclose on this potential.

The preferred Alternative will greatly affect the visual resource as seen from Bradfield Canal. The DEIS (at 4-36) admits that "persons seeking primitive experiences would be displaced..." References to the success of timber harvest methods and thus attainment of VQO's should be accompanied by a description of how windfirmness will be achieved (ie., DEIS at 4-39).

There was no Recreation Planner or Landscape Architect included in the list of preparers. For two resources that are of utmost importance in the Bradfield Canal it is unfathomable that such specialists were not consulted in the planning process.

Fragmentation:

The preferred alternative fragments existing blocks of old growth within the Tom Creek watershed. Reliance on blocks of old growth in the Harding and Marten Creek watersheds (outside the study area) is not adequate mitigation for this fragmentation.

Although unit plan prescriptions for units 3-7 specify maintenance of slash free corridors, unit plan prescriptions for units 15-19, make no mention of this concern specified elsewhere in the document. (DEIS at 4-20).

Retention :

We request that arguments made in the North and East Kuiu Appeal, May 28, 1993, in regards to retention be incorporated in these comments. This is appropriate since the approach for dealing with retention in the Kuiu Plan and the Campbell Plan are identical. We refer specifically to the November, 1984 Tongass Land Management Plan Evaluation Report signed by John Sandor, then Regional Forester, which attempts to clarify confusion surrounding the retention issue.

High Hazard Soils:

Unit 10 is located between two Class I streams with one to several areas of steep to sandy slopes. The Unit Prescription calls for locating patch cuts on more stable areas of the unit. Exactly where are these areas within the unit ? If such areas are not identified on the unit cards how will the public and final layout crew know where they are located? Was a soil scientist available to assist in actual field layout of the unit ? Were these areas flagged? Due to the sensitivity of soils in this unit and its proximity to two Class I streams, this unit should be deleted. Similar problems exist for other units in the study area (12, 19, etc.). In fact, any road building or timber harvest on high hazard soils above anadromous streams or their tributaries is unacceptable.

Cultural Resources:

Only three of the proposed timber harvest units were surveyed for cultural resources. Five timber harvest units have portions that extend into the high probability zone.

(DEIS at 3-27). The high probability zone includes an area around all study area streams and lakes, (DEIS at 3-28), however it is unclear what percentage of this area was actually field checked.

The DEIS claims that "all point specific impacts anticipated below 100 feet in elevation have been or will be surveyed *prior to development*.." [emphasis added] (DEIS at 4-34). The Forest Service must adequately locate, inventory, or nominate all potentially eligible properties in the sale area under its control *before* approving a decision. A failure to meet these requirements increases the likelihood that irreplaceable cultural resources with sacred value could be impacted. While promising to protect all unidentified sites stumbled upon by loggers, the Forest Service provides no data to support its assumption that such management practices will protect resources not yet identified.

Planned Road Card Concerns:

The Campbell, Frank and Tom Creek Road cards were not in sufficient scale to adequately review. How about using the same scale as the Unit Plan Cards? We have serious concerns about the building of road and rock pits on high hazard soils directly above any anadromous fish stream or lake, regardless of mitigation measures designed to minimize this. The location of 2 rock pits above Frank Creek are of serious concern since the road card indicates no blasting occur during periods of heavy rainfall due to "...potentially unstable sites where vibration may induce mass movement." Also, sediments loads entering the stream above and beyond those of normal road building activities will be exacerbated with the presence of the pits.

The road card includes contradictory statements concerning construction of the Frank Creek road "as far as possible into the hillside to prevent construction on the beach," yet in the next sentence specifies "minimum excavation due to blue clay in this area." We need more detail on how this can be achieved.

Monitoring:

The Forest Service has a mandatory duty under NFMA and its own planning regulations to monitor the effects of management activities. The DEIS is replete with claims that implementation of BMP's and TTRA buffer requirements will insure fish habitat and water quality protection. Because this timber sale is so experimental, rigorous monitoring efforts must be employed.

As stated above we are unaware of any rigorous and systematic monitoring efforts on the Stikine Area that meet requirements. A comprehensive effectiveness monitoring program for water quality, which evaluates whether the BMP's are performing as intended, has yet to begin on the Stikine Area or Forestwide contrary to claims made in the DEIS. (DEIS at "Monitoring"). Consequently, there is a notable lack of valid information supporting claims in the DEIS that BMP's are effective at assuring protection of water quality and fish habitat. The one and a half page section on

monitoring included in the DEIS is page is minimal at best and illustrates a lackadaisical attitude toward Monitoring.

Sample of *some* parameters to monitor:

Trees felled only for safety
Protection to goat kidding areas
Migration corridors-vertical and horizontal, slash free, and their effectiveness
Directional falling
Cultural sites
Visual quality objectives achieved?
Buffers - TTRA required, and estuary and beach buffers
Windfirmness of buffers
Leave trees-were diameter limits followed?
Goshawks & murrelets mitigation measures
Minimum clearing widths for designated roads
Road construction on Frank Creek beach area

Page-specific comments:

- Certain statements included in the text are contradictory, ie., "large windthrow or avalanche areas do not exist in the study area," and "long linear avalanche slides are common on the west face of the study area." (DEIS at 3-17).
- What is the size limit for Unit 9? (12" or 16" ?).
- Where is the eagle nest tree referred to in Unit Plan 10?
- The Class III stream on the south edge of the unit 11 is not depicted.
- The definition of "management area" included in the glossary says "two management areas, North and East Kuiu, are included in this study." Woops!
- The discussion on streamside buffers (DEIS at 2-22) should include a discussion on unit design in relation to TTRA mandated windfirmness. The leave strip between unit 26 & 27 appear to be very narrow - less than 100 feet?. Was windfirmness a consideration in design of this leave strip?
- Various unit plans call for leaving 1-8 trees per acre along the east boundary. What is the rational for leaving 1 tree versus 8 trees?
- "Section c of the timber sale contract" needs to be generally defined in glossary.
- What level of reconnaissance was conducted? Please list the IDT specialists (name and speciality) who reviewed each unit, and if the unit was field checked or "paper designed."

We thank you for the opportunity to comment on this DEIS and look forward to our concerns being reflected in a new document.

Sincerely,

Rebecca Knight
Rebecca Knight for
Narrows Conservation
Coalition

United States
Department of
Agriculture

Forest
Service

Alaska Region Tongass National Forest
Stikine Area
P.O. Box 309
Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

Rebecca Knight
Narrows Conservation Coalition
P.O. Box 1331
Petersburg, Alaska 99833

Dear Ms. Knight,

Thank you for your comments regarding the Campbell Timber Sale DEIS. I would like to take this opportunity to respond to your comments. The format of my response will follow the outline of your letter to us. Both your letter and this response will be published in Appendix C of the FEIS.

General Comments:

We are unable to release all of our planning documents during those times when when fishing, hunting or some other work activity is not an issue with some group. The winter may be a better time as far as subsistence and seasonal work but it is no better since this is the time Alaskan's tend to be gone on vacations, particularly other agency personnel during the Christmas holidays. There may be better times, but there is no good time and it would be impossible to place all documents on the same schedule.

I disagree that the Campbell Timber Sale planning process or document(s) are fatally flawed. I also disagree that there is an abundance of areas for timber harvest with a more acceptable location, and less wildlife, fisheries, cultural resources or other issues. The selected alternative (Alternative P) has been specifically formulated in response to public concerns and several changes have been made in the analysis between the DEIS and the FEIS. Listening to and involving the public and other agencies was characteristic of this planning effort (See FEIS, Appendix C, Public Comments and Responses). Therefore, I disagree that the planning process "got off track" and sacrificed resources or the environment.

Purpose and Need

This sale is planned for the independent timber sale market but this does not mean the sale could not be offered to the long-term market. This point is now included in the "Background" section of Chapter 1 in the FEIS because it is not

part of the purpose and need for this sale. Both markets supply jobs and wood fiber. A value analysis for outfitter and guide activities is now included in the FEIS, Chapter 4, Issue 8. This analysis was conducted with certain assumptions which are disclosed and was intended to illustrate a "worst-case" scenario or benchmark for the alternatives. I believe that the actual effects to this segment of the economy will be much less, for many reasons disclosed in the assumptions.

Proposed Action

A proposed action is is only one alternative to begin the planning process under NEPA and is usually derived before full analysis and public involvement. It is simply a starting point and the sale volume is simply one of the descriptors. Alternatives to the proposed action that satisfy the purpose and need are also examined under NEPA. Additionally, a "proposed action" is not the same as a "preferred action" under NEPA as your letter seems to indicate. The scoping document to which you refer clearly states that the proposal to harvest 8 MMBF is "simply a starting point for the planning process" and "other alternatives which meet the Forest Supervisors objectives will also be considered."

The objective for any NEPA analysis is established in purpose and need statement. In this case the purpose and need was identified as "to consider specific alternatives to harvest timber within the project area given the guidance in the Tongass Land Management Plan." In this case I was interested in examining the capability of the area to support timber harvest and exploring different approaches that might arise from an "ecosystems look" at the project area. Accordingly, it was appropriate to develop a range of alternatives that resulted in different harvest levels.

However, there were several changes between the Draft and Final EIS which reduced the predicted volumes of all alternatives. More field reconnaissance revealed that two of the units were infeasible and there were some changes in harvest prescriptions and sizes. The volumes in the FEIS now range from 7 MMBF to 20.5 MMBF. The alternative with the most harvest (Alternative E) is very important to the range of alternatives because it shows me the effects of harvesting in Tom Creek and the maximum harvest achievable. The selected alternative (Alternative P) harvests 11.6 MMBF and was specifically formulated from public comment.

In other timber sale planning efforts we have used a more conventional approach to project design and have had fewer questions about the capability of the project area to support timber harvest. In these projects, we have established a project objective that is more closely tied to a timber volume target and then developed a range of alternatives that explore different ways to achieve the target volume. In either case the objective for the project is identified in the purpose and need statement and the proposed actions and alternatives to the proposed action all explore various means of achieving the objective. I do find it interesting that you have been equally critical when the harvest volumes in the alternatives do not vary much as you have been when they do vary.

We are also disappointed we were not able to meet with Narrows Coalition members during the planning of this sale. There were two attempts made to set up meetings with the Narrows Coalition by phone when our Interdisciplinary Team Leader was in Petersburg on other business. In addition, since you sent us preliminary comments, you also received a "thank-you" note with an enclosed notice for an "Open House" (during the week of August 5, 1992) which invited the public to stop by the Wrangell Ranger District to discuss the planning for the sale informally. The notice also stated that if the times listed were not convenient to call for an appointment. Six individuals took advantage of this invitation including the President of the Wrangell Resource Council. Throughout the planning process we also met several times with Alaska Department of Environmental Conservation, Alaska Department of Fish and Game and the US Fish and Wildlife Service, including two field trips. We also did meet with and phone several timber industry representatives primarily to discuss critical factors associated with the logistics and operations of helicopter harvest. Concerns for road impacts on wildlife and economics associated with helicopter harvest lead us to consider "single entries" in watersheds of the project area under the alternatives. In this way, we could harvest suitable and accessible areas, make a single entry into discrete areas within the rotation and close roads, thereby increasing economics and decreasing the impacts to other resources. This strategy also resulted in a corresponding increase in the volume of the alternatives.

Several months ago the Stikine Area made a recommendation to the TLMP Revision Team to change the allocation of the project area from timber production to a combination of semi-primitive and modified landscape in the preferred TLMP Revision alternative. This change was made by the TLMP team. Other alternative allocations are provided for the project area by other Forest Plan alternatives. Additional refinement of the alternatives in TLMP is possible during the revision process. The Forest Supervisor can make further recommendations to the TLMP planning team as can other individuals and organizations.

Log Transfer Facilities

The location of the West Face LTF was inadvertently left off the alternative maps. This has been corrected in the FEIS. Log Transfer Facility "Cards" are also included in the FEIS along with the unit and road cards in Appendix A.

I agree with your assessment that suitable LTFs were difficult to locate for this sale. Unfortunately, two to three LTFs would be necessary to log the Campbell area because building roads to connect all helicopter landings to one LTF would be impossible or cause substantial adverse effects to the upland environment. In fact, the best LTF site is located in the Tom Creek watershed where upland resource values are the greatest. Therefore, I chose not to log this watershed.

The selected alternative (Alternative P) only develops the West Face LTF site based on comments on the draft and recommendation made by the Fish and Wildlife Service, ADEC, ADF&G. Between the Draft EIS and Final EIS underwater

investigations of the Frank Creek and West Face sites were conducted by the Fish and Wildlife Service. Chapter 4, Issue 3 has been revised in the FEIS and includes new information concerning LTFs and transportation of logs. The dive reports are also included in Appendix E of the FEIS.

The use of barges is an option for this sale but the effects to the marine environment from using barges or helicopter drops directly into saltwater would be less than developing and operating Log Transfer Sites (FEIS, Chapter 4, Issue 3). There are more temporary impacts to boat traffic from the increased numbers of barges in the project area which is also disclosed in Chapter 4 of the FEIS. However, we believe that an alternative completely reliant on barges is not feasible for this area. A land based area for the limbing, sorting and bundling of logs is needed in the project area. Therefore, we chose to analyze for the scenario with more impacts (the construction of a land based LTF) and describe the effects of the other options the operator may choose to use. Under the selected alternative I chose not to require the operator to log the sale entirely with a barge because I believe the marine resources are adequately protected and because I believe this lends this sale more flexibility in the way it can be logged. I believe that the range of alternatives is responsive to the various methods of log transportation which are described in Chapter 4. We can only describe the impacts associated with these other methods based on the best available information since many of the aspects of the sale experiment with harvest methods. We have revised the FEIS, Chapter 4, Issue 3 section describing the methods, rationale and effects of various methods of log transfer.

Rehabilitation measures for intertidal and subtidal areas at Log Transfer Sites can include the removal of any fill which decreased the amount of "wetted" area at the time of construction. This would reestablish the natural contours of these areas so that marine life would reinhabit in a relatively short period of time. This is possible and would be called for at the Frank Creek site which is no longer proposed for development. The impacts of the Log Transfer Sites is discussed under "Unavoidable Environmental Effects" in Chapter 4 of the FEIS.

High Value Goat Habitat

Units #1, #2 and the west half of unit #3 were dropped in the formulation of the selected alternative after consultation with our own biologists, ADF&G and the Fish and Wildlife Service after comments were received on the DEIS. Although I understand that Narrows Coalition would prefer to see no harvest of any goat habitat, I believe that this strategy adequately responds to the need to protect this type of habitat within the WAA (the landscape scale) and the VCU (the project scale). There is a total of 3822 acres of high value goat winter range in the WAA and 1092 acres in the VCU. Some of the best of this habitat is adjacent to saltwater where maritime influences seem to reduce snowloads over similar interior areas. There are 1450 acres of saltwater facing high value goat winter range in the WAA and 670 acres in the VCU. The largest contiguous block of this habitat in the WAA is 660 acres and occurs on the West Face and the adjacent Marten Creek VCU. The selected alternative would harvest 19 acres (3%) from the fringes of this block, leaving the rest intact and minimizing any

potential problems with utilization of the rest of the block. The selected alternative would harvest a total of 95 acres of high value goat winter range, leaving 97% of this habitat in the WAA and 91% in the VCU. Most of this remaining habitat is not scheduled for harvest either in the current Forest Plan or the preferred alternative in the revision.

Alternative B was provided in the range of alternatives in order to consider an alternative that did not harvest any high value goat winter range on the West Face as you suggest. Also, Alternative G considered an alternative to harvest within goat winter range using group selection. I did not select either of these alternatives and chose to proceed with the above strategy largely due to harvest economics, the uncertainty that group selection methods would be successful in retaining goat habitat and my belief (based on analysis in the FEIS) that the goat population will adequately be provided for while meeting the purpose and need for this project and the desired future condition of the area as described by the Forest Plan.

Marbled Murrelet and Queen Charlotte Goshawk

NEPA contains no provisions mandating that wildlife surveys be conducted. We did conduct surveys for murrelets and goshawks as well as other species. However, the level of surveys recommended by the Fish and Wildlife Service was not possible at current funding and personnel levels. We try to mitigate for the resulting uncertainty by providing that, in the event a goshawk or murrelet nest is found, there are provisions to protect it. The interim management guidelines for goshawks will likely be amended as new data is available. The Forest Service and ADF&G are currently conducting a study of goshawk habitat relationships that should help evaluate these guidelines. However, there is presently no data which indicates that these interim guidelines are inadequate.

During the preparation of the DEIS the Interagency Viable Population Committee report was (and still is) in draft form and not readily attainable to most readers. There is still no direction on the implementation of the recommendations. However, this sale is responsive to many of the recommendations. For example, medium Habitat Conservation Areas (HCA's) are provided by the adjacent watersheds of Marten Creek and Harding River, which are not managed for timber production and are indeed mapped on the example included in the May, 1993 draft of the report. Also, a small HCA could easily be located within the Tom Creek watershed; 500' beach and 1000' estuary buffers are maintained; roads will not be constructed under the selected alternative or closed under the other alternatives, and a floating camp will be required to reduce bear/human conflicts. The measures not incorporated into the sale include 200-300 foot buffers on all anadromous fish streams and winter habitat recommendations for goats may only be marginally met based on habitat capability estimates but it is difficult to determine what the committee meant by making this last recommendation for "discrete populations" in their report.

Brown Bear Habitat

The habitat capability model predicts high value bear habitat in the units mainly due to their proximity to Frank Creek, an anadromous fish stream. Mitigation measures implemented to protect the stream are expected to maintain the important aspects of accessibility to fish. Data from ADF&G's brown bear study on Chichagof Island (Schoen et. al. 1992) indicates that bears continue to make use of salmon streams in logged watersheds. The major concern for brown bears is mortality associated with human contact along roads. The selected alternative will not construct a road in Frank Creek. Additionally, units #11 and #14 have been dropped.

Utilization Standards

We agree that leave trees should be a variety of sizes. There is no size limit on leave trees which were marked in some units in addition to the 12" or 16" diameter limit. In addition we are recommending that fallers leave as many unmerchantable trees standing as possible as allowed by Occupational Safety and Health Administration (OSHA) requirements. The 12" and 16" diameter limits are the lower size limit of trees that may be harvested. Some of these trees will continue to grow or be "released" for additional growth after harvest of the overstory. The combination of diameter limit harvest and additional larger leave trees should result in a second growth stand with greater structural diversity than a clearcut.

Ecological Zones

There can always be improvement in the definitions of ecological zones based upon more site-specific information and research. We defined the zones based on our knowledge of ecology and the key issues for this project area. The 500' beach fringe buffer is based on the location probabilities of inventoried eagle nest trees on the Tongass National Forest (they lie within 500'). We don't argue that there could be a better definition but we were unable to come up with a better indicator for the Saltwater Influence Zone. We also did not rule out that people and their values are part of the ecosystem. Therefore, these zones do contain some parameters that are human dependent such as the "Upland Saltwater-Facing Zone." This zone also contains some of the most valuable wildlife habitat because of its south facing aspect and direct access to saltwater. Not only is this zone "seen" by people but we also feel it functions differently as wildlife habitat. Thus, we combined the human ecology and the wildlife ecology factors into a single zone. You are correct in stating that the "Freshwater Influence Zone" is partially composed of TTRA buffers and other criteria. In retrospect, we might have also made a separate zone for the Tom Creek Watershed which we feel is ecologically different from the Frank Creek watershed. We are continuing to learn more about how to integrate ecological concepts into project planning. These were initial efforts on which we hope to build. Your criticism are valid and we will improve based on suggestions from the public and other agencies. The more specific these suggestions are, the better we are able to integrate them into the planning process.

The cutting units are located in productive forest land, according to our policies they can not be located elsewhere. Due to the fact that all the units (except some in Alternative E) are being yarded with a helicopter (as opposed to cable "settings") they can take the shape of natural stand boundaries. On the West Face this is especially true. The project area is also predominantly composed of volume class 5 stands, especially on the West Face and in Frank Creek. Therefore, most of the harvest is within these stands which are not considered a "high" volume class at 20-30 MBF/acre. Volume class 5 stands are considered moderate in volume since there are only volume class 4, 5 and 6 stands within the project area.

The alternatives do vary in the amount of activity within each zone (See FEIS, Chapter 2, Comparison of Alternatives). However, you are correct in stating that this was not the only factor important to the range of alternatives. The geographic location of harvest (West Face, Frank Creek vs. Tom Creek) also distinguishes the alternatives as we responded to the ten issues described in the FEIS, Chapter 1. If our ecological zones had incorporated both ecological processes and geography there probably would have been even greater correlation between the zones and the alternatives. Again, we feel the concepts of "zones" is valid and helpful in project planning, but we can always improve the way the zones are defined and used.

Estuaries

Estuary buffers are not required but we chose to implement 1000' buffers on three estuaries in the project area where additional buffering would protect the the use of mud/sand flats and grassflats which are valuable to a variety of species. The transition from uplands and freshwater, to saltwater at the mouth of the Creek flowing near the West Face LTF is very abrupt. Features generally associated with estuaries are also not present (ie. gradual slope, mudflats, sandflats or grassflats). Therefore, we believe that the habitat values surrounding this stream and estuary are adequately protected by the unit and Log Transfer Facility design.

Fisheries and Stream Crossings

The road cards in the FEIS have been revised. This has been dropped from the selected alternative. The unit cards have also been revised in the FEIS to include more specific information.

Inland Wetland Habitat

Inland wetland habitat was defined in the glossary as inclusive of a 500 foot distance around 10 acre or greater lakes, beaver ponds, marshlands and associated grass/sedge meadows. This is a definition, not a requirement for management. However, none of these areas as defined, will be impacted by the selected alternative. Only two of the lakes in the project area have names; Campbell Lake and Tom Lake. There is no harvest adjacent to either in any of the alternatives.

Between the DEIS and the FEIS we consulted with the Fish and Wildlife Service regarding appropriate timing restrictions to protect geese during nesting. We have adopted their recommendations and they are included in the FEIS, Chapter 2, Mitigation section.

Extended Rotation

You may be correct that under ecosystem management we will learn that forest rotations should be longer for the project area.

Recreation and Visual Quality

The Harding and Tom Creek areas are not impacted by the selected alternative. In addition, there will be no construction of roads in the adjacent Frank Creek watershed. Both bear populations and the primitive character of these areas are protected. Therefore we have not foreclosed on the potential of these areas for bear viewing.

Between the DEIS and FEIS some economic analysis was added to Chapter 4 to assess the "worst-case scenario" of impacts to outfitting and guiding. This analysis has many assumptions which should be carefully reviewed. I believe that the impacts of the selected alternative will be much less than this scenario.

The Interdisciplinary Team Leader is a Landscape Architect who also holds a degree in Forestry (See DEIS and FEIS, Chapter 5, List of Preparers). She is also qualified as a Recreation Planner and conducted most of the social analysis, which included the scenic and recreation values.

Fragmentation

Fragmentation occurs in the Frank Creek and West Face areas under the preferred alternative in the DEIS and the selected alternative in the FEIS not in the Tom Creek watershed. The Tom Creek area is naturally fragmented with muskegs. According to the Interagency Viable Population Committee report cited earlier in your letter, the Marten and Harding River Watersheds are recommended as possible medium HCA's to provide sufficient old growth habitat to maintain viable populations of old growth dependent wildlife species.

The sentence on page 4-20 refers to leaving adequate distance between units on the West Face and the East side of Frank Creek to allow for vertical and horizontal movement of wildlife between units in the project area. The slash free corridors referred to in the unit cards are to be accomplished with Knutson-Vandenburg (KV) funds. Their purpose would be to provide slash free corridors through the units if they are determined to be necessary after the sale is implemented. The availability of these funds depends on the price the purchaser pays for the timber, since a percentage are collected for KV projects.

Retention

I am unable to respond to your concerns about the designation of old growth areas on the Campbell Timber Sale since you have not furnished us with any site specific information about your concerns. As for the process being used on the Campbell Sale being the same as that used on the North and East Kuiu project, the Regional Foresters decision on the appeal of the North and East Kuiu project confirmed that the process used is appropriate and conforms to the direction in the Forest Plan.

High Hazard Soils

Unit #10 is located on soils developed in stratified glacio-lacustrine deposits as outlined in Figure 3-2. These soils are erosive when disturbed and are generally unstable in cut and fill slopes. To minimize the risk of adverse impacts, unit #10 will be yarded with helicopter to avoid disturbance. Additionally, no roads will be built in or near tributaries to Frank Creek in the selected alternative. A soil scientist, hydrologist and several other specialists have reviewed the units in the field. They are now listed on the unit cards in the FEIS.

Cultural Resources

You are correct, I should have sufficient information about the nature of cultural resources in the project area prior to signing the Record of Decision. As of August 7, 1993 we completed the Section 106 process for the Campbell Timber Sale which calls for final concurrence with the State Historic Preservation Officer. This more than adequately meets both NEPA and National Historic Preservation Act requirements. Prior to the issuance of the DEIS, we received concurrence from the State Historic Preservation Officer on the methods and inventory strategy. Also, 781 acres of the total 1,110 acres (70%) of high probability area had been surveyed prior to the issuance of the Draft. I feel we conducted a high quality survey of the potential areas for cultural resources. Our surveys resulted in the identification of several sites. Both the process and results received concurrence from the State Historic Preservation Officer. This process and the results are located in Chapter 3 and 4 of the FEIS.

Planned Road Cards

The road cards have been revised in the FEIS. The statement concerning the Frank Creek road gave direction to maintain as much of a buffer as possible on the beach while avoiding excavation into blue clay (fill is acceptable on blue clay). These statements are not contradictory. No roads are planned as part of the selected alternative.

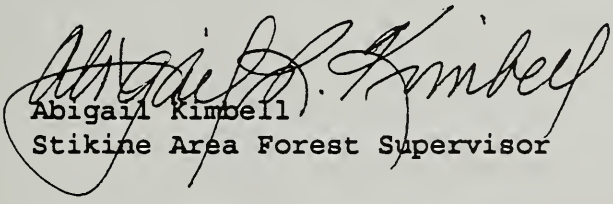
Monitoring

The monitoring section in the DEIS has been revised in the FEIS and includes effectiveness monitoring.

Page-specific Comments

- Snow avalanche slopes dominated by brush are common on steep slopes at high elevations throughout the study area, however, large landslide or debris avalanche tracks do not occur. This sentence in the DEIS has been clarified in the FEIS.
- The diameter limit for unit #9 for Alternatives D and E is 16". Alternatives B, F, G and P call for a 12" diameter limit.
- The eagle nest tree referred to in this unit card is south of unit #9 and was mentioned because it may occur in the flight path for unit #10.
- Unit 11 has been dropped from all alternatives.
- Thank you. The term and definition has been deleted.
- Windfirmness was taken into account in the design of all units. The strip of timber between units 26 and 27 is scrub timber and is windfirm.
- The actual number of larger leave trees left depends on the availability of suitable wildlife trees in the right locations which do not pose a safety hazard to logging personnel or an obstacle to yarding. The loggers will be encouraged to leave additional unmerchantable trees when they meet safety requirements.
- A definition of "Section C" has been provided in the Glossary of the FEIS.
- The IDT specialists involved in reconnaissance is listed on the Unit Cards in the FEIS.

Thank you again for your in depth comments on the Campbell DEIS.


Abigail Kimbell
Stikine Area Forest Supervisor

Lezlie Murray
Box 956
Wrangell, AK. 99929

- July 13, 1993

Dear Campbell Timber Sale IDT,
Thank you for this opportunity
to express my views on this
upcoming sale, and your
well designed Draft EIS.

I applaud the Team's ecosystem
management approach on the
Campbell sale. It is my
view that the approach you
have taken will be the
norm in the not too distant
future, looking for a balance
of all resource values,
together with cumulative
effect is the responsible
approach, and one that is

gaining wide favor from the President on down. Your leadership is greatly appreciated.

I support Alternative D, and believe it is the most event garde of the alternatives that you have presented. It eliminates the need for a road, saving both money and brown bear habitat from unnecessary dissection. It also has the least amount of effect on riparian corridors, which as you so aptly point out are such dynamic and valuable areas for the widest range of animal species.

Alternative D, with helicopter logging as its

(3)

method for transporting logs to barges, is a truly bold step towards the future timber harvest methods in SE Alaska. With small units and varied styles -- overstory removal, overstory removal w/ leave trees and patch cuts, -- of timber harvest, you should be able to carefully monitor the areas harvested and learn from these experiences to help fine tune your techniques in the future.

I understand that the LTF helps make this Alternative more cost effective.

What cost savings might be made if the helicopters loaded the logs directly onto

(4)

barges? Without the creation of an LTF you'd save money and the effects on the area, West Face, that it would be placed, saving the need to rehabilitate the area later. All in all I support Alternative D, and ask that you look at eliminating the LTF for the reasons I've mentioned.

Once again,
thanks for your great
work and the chance to
comment,

Sincerely,

Lizbeth Murray

United States
Department of
Agriculture

Forest
Service

Alaska Region Tongass National Forest
Stikine Area
P.O. Box 309
Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

Lezlie Murray
P.O. Box 956
Wrangell, Alaska 99929

Dear Ms. Murray,

Thank you for your comments and compliments on our Interdisciplinary Team effort. We have much to learn as the concepts and principles of ecosystem management continue to evolve. Comments from the public, such as yourself, are important to this evolution. I would like to take this opportunity to respond to your comments on the DEIS for the Campbell Timber Sale. Your letter and this response will be published in the Final Environmental Impact Statement (FEIS).

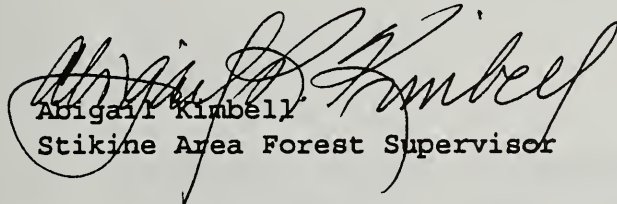
I agree that Alternative D has many attractive features. A new alternative (Alternative P) was developed after we received comments, such as yours, on the DEIS. Alternative P combines many of the same features you liked about Alternative D (no roads, only one log Transfer Facility on the West Face, lower environmental impacts, etc.) but does try and harvest more area up Frank Creek than Alternative D. This does make some short-term sacrifices to economics but I was concerned that under Alternative D, some areas capable of producing timber now and in the future would never be economically feasible to log unless they were harvested this entry while the helicopter was mobilized in the immediate area. Alternative P is essentially the same as Alternative D except that it harvests more area up Frank Creek than Alternative D.

I agree that the results of the experimental harvest techniques should be monitored and we have plans to do so if funding is available as listed in the monitoring plan of the FEIS, Appendix B.

We felt that the West Face Log Transfer Site was still important to the feasibility of logging the sale and would actually reduce the overall operating costs. This does not preclude the operator from logging the sale using barges but simply gives more operators (who do not all have the same equipment) more logistical options to log the sale. Rental of barges is expensive and several would be needed to harvest the sale if no land based facility was available. There is a large amount of slash generated by helicopter logging at the landing (or barge). This slash needs to be disposed of and would either have to be transported to another location, burned on the barge or helicoptered back to

land. By having a land-based facility as an option for the operator, logs can be dropped in the water, transported over to the LTF, removed, limbed, sorted and placed back into the water in bundles. The slash can then be disposed of on land by burning. If all these activities were to take place on a barge it would be more time consuming, require more space (ie. more barges) and be more expensive.

Again, thank you for your comments, suggestions and encouragement. Please feel free to comment on other Stikine Area projects as your time and interest allows.



Abigail Kimbell
Stikine Area Forest Supervisor

July 13. 1993

Troy Gordon
HCR 1, Box 13-C
Newburg, MO 65550

Meg Mitchell, Team Leader
Stikine Area
Tongass National Forest
PO Box 51
Wrangell, AK 99929

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE CAMPBELL TIMBER SALE, TONGASS NATIONAL FOREST

I support Alternative A "No Action" for the proposed Campbell Timber Sale in the Tongass National Forest at the present time. My primary reason for supporting this alternative is to oppose below cost timber sales, which have historically been the rule in the Tongass National Forest. In addition, there are many environmental costs to proceeding with this timber sale. Presumably, these costs are currently being evaluated during the revision of the Forest Plan. Until the revision and review of the Forest Plan has been completed, I do not believe this sale should proceed.

While I am opposed to this sale at this time, I do not categorically oppose timber cutting in National Forests. I live within the Mark Twain National Forest, and I support timber harvests in National Forest areas that are environmentally sound and are conducted on a basis such that the sales are not below cost. However, the Campbell Timber Sale does not appear to meet either criteria, and therefore, I oppose it and support the "No Action" alternative.

Thank you for the opportunity to comment on this timber sale. Please continue to keep me informed on this project's progress.

Sincerely,



Troy Gordon

United States
Department of
Agriculture

Forest
Service

Alaska Region Tongass National Forest
Stikine Area
P.O. Box 309
Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

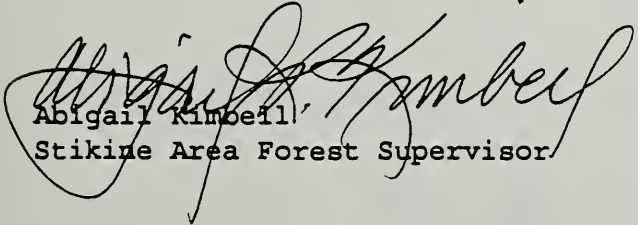
Troy Gordon
HCR 1, Box 13-C
Newburg, MO 65550

Dear Mr. Gordon,

Thank you for your comments regarding the Campbell Timber Sale DEIS. Although your comments were received after the July 14, 1993 deadline for comment, I would like to respond to your concerns about environmental and economic costs. Both your letter and this response will be published in the Final Environmental Impact Statement (FEIS).

The mid-market analysis discussed in the DEIS and FEIS shows that three of the alternatives are considered economic offerings including Alternative P, the selected alternative. The selected alternative was developed based on public comment on the DEIS. It utilizes helicopter yarding and partial cutting techniques for all units, develops no roads and only one Log Transfer Site for the transportation of logs to and from land. Several mitigation measures also help minimize impacts to the environment.

I believe that Alternative P provides for the best possible mix of resource and ecosystem values, minimizes impacts to the environment and results in an economic offering at a mid-market analysis. Thank you again for your comments. We welcome your continued participation in this and other projects on the Stikine Area.


Abigail Kimbell
Stikine Area Forest Supervisor

July 9, 1993

Wrangell Ranger District
Wrangell Alaska 99929

Dear Sirs,

Although I do not have the Forest Service form you mailed me, I would like to comment on the proposed Bradfield Canal Timber sale.

I prefer your alternative I -- No action at all.
(No logging in the Bradfield)

In fact, I'm outraged that you would consider any type of harvest - even selective harvest--of old-growth timber in that important scenic recreation place.

Being adjacent to Anan, one of our most important tourist attractions, I-think the Bradfield is a great place for the ecotourist to experience unspoiled wild Alaska by boat or plane or kayak after seeing the bears and fish at Anan.

Any logging would be a detriment--even helicopter logging would be a major disruption to the wildlife. Bad logging practices have already ruined the Bradfield River years ago, and wiped out a very special run of large King salmon. Granted poor Fisheries management was also responsible--but if you had not allowed the permanent river damage by logging--the big kings could have been reintroduced from other stock at least. But not the same unique fish.

Losing that run of fish has been a big loss to the fishing economy here and sport and charter opportunities.

Shouldn't The Forest Service be-ashamed to allow logging anywhere in Bradfield Canal after that fiasco?

Lucille Merrill

Lucille Merrill
Box 702
Wrangell, Alaska
99929

Wrangell Ranger District	
JUL 14 '93	
Act.	
Dist. Ranger	
B.M.A.	
T.M. Oper.	
O.R.A.	
F&W	
Planning	
Engineering	
Log Accl.	
Resource Clerk	

United States
Department of
Agriculture

Forest
Service

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Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

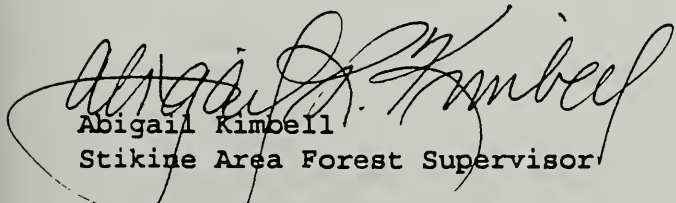
Lucille Merrill
Box 702
Wrangell, Alaska 99929

Dear Ms. Merrill,

Thank you for sharing your concerns about the scenic and tourism potential of the Bradfield Canal and preference for the "no action" alternative in your response to the DEIS for the Campbell Timber Sale. I would like to take this opportunity to respond to your comments. Your letter and this response will be published in Appendix C of the Final Environmental Impact Statement (FEIS).

The selected alternative was formulated from public comment on the DEIS. I chose this alternative (Alternative P) because I feel that it does protect the scenic and recreation qualities of the Bradfield Canal by using partial cutting techniques. None of the harvest activities will be visible from travel routes to and from Anan. While conducting some interviews with outfitters and guides in order to better analyze the impacts of harvest on their activities, some felt that their clients recreation experience would be impacted while others felt that harvest would not impact their clients (See FEIS, Chapter 4, Issue 8). Also, many of the watersheds which are most utilized by outfitters and guides for their scenic, fishing and recreation value will remain in a natural condition (Harding River, Marten Creek and Eagle River). The sale design also reduces the potential impacts to fish and wildlife resources because no roads will be built and harvest units are designed to avoid many sensitive areas. These practices are far superior to some of the techniques used to log the Bradfield River in the 1960's.

Thank you again for your suggestions. We hope you will continue to comment on future Stikine Area projects as your time and interest allows.


Abigail Kimbell
Stikine Area Forest Supervisor

Box 20396
Juneau, AK 99802
July 5, 1993

Meg Mitchell, Team Leader
Stikine Area
Tongass National Forest
P. O. Box 51
Wrangell, AK 99929

Dear Ms. Mitchell,

Thank you for the opportunity to comment on the Campbell DEIS. I am writing these comments as a private citizen who is concerned with maintaining economic stability for local communities and habitat stability for the wildlife who are at risk when humans attempt to manage an ecosystem with short range goals. Following is a list of some issues that I think are critical and some actions which I hope the Forest Service will seriously consider.

* In Chapter 1 it states that the "proposed action for the Campbell Timber Sale is to remove approximately 8 million board feet from the project area. (DEIS, 1- 3). Only Alternative B proposes a harvest close to this amount (8.8MMBF) and it exceeds the amount by .8 MMBF. Alternative D proposes 11 MMBF, Alternative E proposes 22.1 MMBF, and Alternative F proposes 15.9 MMBF. The harvest level of 8 MMBF is the maximum amount that should be harvested from this area. I question the Forest Service's policy of "ecosystem management" if three out of four alternatives advocate cutting more than the proposed action.

* Another issue of concern in the Campbell DEIS is accurately assessing the effects of timber harvest on goat winter range, disturbance of kidding and rearing area and travel corridors. Alternative B would have the least effect of the action alternatives by harvesting 2% and 0.5% of high value habitat (DEIS 4-22). A Strategy for Maintaining Well-Distributed, Viable Populations of Wildlife Associated with Old-Growth Forests in Southeast Alaska, Review Draft of 1992 stresses the importance of maintaining areas in lower elevations. Areas in lower elevations have less snow fall and goats will be able to forage during the winter. If timber harvest avoids areas where goats forage, goat populations will have a much greater chance of surviving tough winters when goats must survive on conifers, lichens, mosses and shrubs.

The Viable Populations report indicates "that females tend to be sedentary and use relatively small home ranges.....The mean distance between centers of summer and winter ranges was 1.2 mi for females." (Viable Populations, p 274) On that same page, it states that females goats do not explore new areas. Young goats also stay close to the ranges of their mothers. In general goats do not disperse far. It cannot be assumed space is available for goats to move into another range and successfully survive. Therefore, the maintenance of their habitat is critical if they are to survive in this area.

Goats suffer with changes in habitat and human occupation. "Mountain goats are more sensitive to habitat change and hunting pressure than any other big game species in North America. Studies throughout their range in North America have reported significant declines in populations of mountain goats following modification of habitats and disturbance from human activities"(Viable Populations, p 275).

I request that areas on south facing slopes be avoided entirely, especially the south facing ridge between Frank's Creek and Marten Creek. I also request that the Agency limit helicopter operations during periods when goat populations are susceptible to harassment, i.e. during winter or early spring, when the noise of helicopters could negatively affect the young.

* I would like to see the area around Tom's Creek not used for timber harvest. The Forest Service must accept recreational use of this area as a high priority. "The Tom Creek area is the most important recreation place in the study area based on public scoping for this project, information received from outfitters and guides, the scenic diversity and the presence of several lakes (DEIS 3-32). Therefore, if the Forest Service is sincere about providing recreation opportunities for humans, they must set aside areas which have been designated as high priority by residents and guides. The demands for recreation will only increase with time. Economic diversity resulting from tourism will help communities maintain stability.

Lower Tom Creek, below Tom Lake, is unique in its structure. It contains steep valleys with unstable sideslopes. Close to the steep valleys are floodplains with oxbows, alluvial fans and freshwater meadows (DEIS, p 3-57). Because of the uniqueness of the creek, the Forest Service must provide ultimate protection for this riparian area.

Tom and Frank Creeks are the most important fish producing streams (DEIS 4-1). Commercial and sport fishermen are dependent upon all fish streams maintaining strong fish runs; the loss of one stream will have a small, but noticeable effect upon commercial and sport fishing. Wildlife also will be affected if watersheds are impacted by timber harvest. Many animals such as bear, otter, and eagles will feel the effects of smaller fish runs.

Any roading in Tom's Creek could be difficult to build and expensive to stabilize. Sand deposits have been found in Tom's Creek which, if disturbed, could cover fish spawning areas and cause landslides into the stream. Once fish runs are destroyed, they will not return for that year class. These streams must be protected; mitigation measures will not protect fish runs once a road has been built.

Brown bear are extremely sensitive to human encroachment. Since a correlation between brown bear kill and cumulative length of road construction has been reported by Schoen and Beier, and a road along Tom Creek would be particularly detrimental because of its location near a heavily used bear trail connecting Tom Creek and the Harding River drainages (DEIS 4-2), I recommend that roading be kept to an absolute minimum and that hunting be curtailed during this project. The Viable Populations study reports that resource extraction activities could damage bear populations since bears require large tracts of undisturbed land. Watersheds are particularly important to brown bears and are necessary to provide food and travel corridors (Viable Populations, p 186-187).

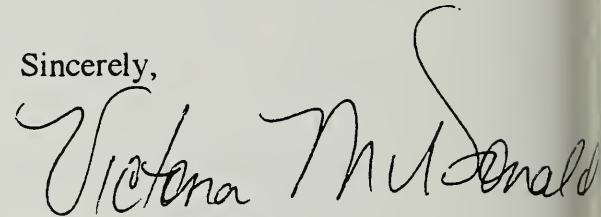
* The table in Chapter 4, page 16, is perplexing. Once an area has been cut, it is no longer provides a suitable habitat for many species. Marten require old growth trees and snags which are removed when timber harvesting occurs. Alternative E would affect habitat capability the most, yet according to the table, brown bear would retain 96% of original capability. Marten would still have 91% of their habitat capability with Alternative E. I do not think the Agency has truly assessed the impacts of this timber sale on wildlife.

* In Chapter 4, page 28, it states, "...most units leave some scattered, larger trees for increased diversity." Leaving larger trees is essential for maintaining a vestige of the old growth, and I would like to see a precise idea of how many larger trees will be included per

acre of timber cuts. The Forest Service could provide an example of ecosystem management with this timber sale if larger clumps of trees were left to provide an overstory layer.

Thank you for your attention. The Tongass National Forest must be protected for all species and to provide habitat, recreation and subsistence for generations yet to come.

Sincerely,

A handwritten signature in cursive script that reads "Victoria McDonald". The signature is written in dark ink and is positioned above the printed name.

Victoria McDonald

United States
Department of
Agriculture

Forest
Service

Alaska Region

Tongass National Forest
Stikine Area
P.O. Box 309
Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

Victoria McDonald
P.O. Box 20396
Juneau, Alaska 99802

Dear Ms. McDonald,

Thank you for your comments on the Draft Environmental Impact Statement (DEIS) for the Campbell Timber Sale. I appreciate your thoughtful response and would like to take this opportunity to respond. My response roughly parallels the sequence of points in your letter. Both your letter and this response will be published in the Final Environmental Impact Statement (FEIS).

A proposed action is is only one alternative to begin the planning process under NEPA and is usually derived before full analysis and public involvement. It is simply a starting point and the sale volume is simply one of the descriptors. Alternatives to the proposed action that satisfy the purpose and need are also examined under NEPA. Additionally, a "proposed action" is not the same as a "preferred action" under NEPA. The objective for any NEPA analysis is established in purpose and need statement. In this case the purpose and need was identified as "to consider specific alternatives to harvest timber within the project area given the guidance in the Tongass Land Management Plan." In this case I was interested in examining the capability of the area to support timber harvest and exploring different approaches that might arise from an "ecosystems look" at the project area. Accordingly, it was appropriate to develop a range of alternatives that resulted in different harvest levels.

However, there were several changes between the Draft and Final EIS which reduced the predicted volumes of all alternatives. More field reconnaissance revealed that two of the units were infeasible and there were some changes in harvest prescriptions and sizes. The volumes in the FEIS now range from 7 MMBF to 20.5 MMBF. The alternative with the most harvest (Alternative E) is very important to the range of alternatives because it shows me the effects of harvesting in Tom Creek and the maximum harvest achievable. The selected alternative (Alternative P) harvests 11.6 MMBF and was specifically formulated from public comment.

Units #1, #2 and the west half of unit #3 were dropped in the formulation of the selected alternative after consultation with our own biologists, ADF&G and the

Fish and Wildlife Service after comments were received on the DEIS. Although I understand that you feel that none of the goat habitat should be harvested, I believe that this strategy adequately responds to the need to protect this type of habitat within the WAA (the landscape scale) and the VCU (the project scale). There is a total of 3822 acres of high value goat winter range in the WAA and 1092 acres in the VCU. Some of the best of this habitat is adjacent to saltwater where maritime influences seem to reduce snowloads over similar interior areas. There are 1450 acres of saltwater facing high value goat winter range in the WAA and 670 acres in the VCU. The largest contiguous block of this habitat in the WAA is 660 acres and occurs on the West Face and the adjacent Marten Creek VCU. The selected alternative would harvest 19 acres (3%) from the fringes of this block, leaving the rest intact and minimizing any potential problems with utilization of the rest of the block. The selected alternative would harvest a total of 95 acres of high value goat winter range, leaving 97% of this habitat in the WAA and 91% in the VCU. Most of this remaining habitat is not scheduled for harvest either in the current Forest Plan or the preferred alternative in the revision. Timing restrictions will be implemented for use of the West Face LTF and helicopter yarding of units to protect goats using the area in the winter and kidding habitat (See FEIS, Chapter 2, Mitigation Measures).

The selected alternative does not harvest in the Tom Creek watershed for many of the reasons you suggest. Presently the Tongass Land Management Plan is being revised. I will take your comments regarding the future management of the Tom Creek area for recreation values, into account as the TLMP process continues.

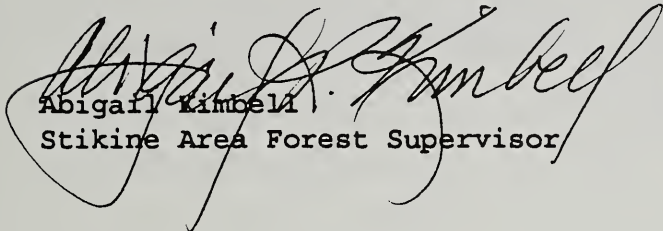
I concur with your suggestion that closing the harvest area to the hunting of brown bear during sale operations is a possible mitigation measure to further reduce impacts to brown bear. I will make this recommendation to the Federal Subsistence Board who presently has jurisdictions over hunting on federal lands. I can not guarantee that they will act favorably upon this request. This recommendation is listed in the FEIS, Chapter 2, Mitigation Measures. Also, roads will not be constructed in the selected alternative (Alternative P).

The habitat models assign index values from 0 to 1 for each parcel of land based on vegetative and geographic characteristics (ie. stand type, slope, aspect, proximity to anadromous fish streams etc.). The model calculates the original condition and compares it to each alternative. The values assigned were determined by interagency committees based on research results and best professional judgement. The fact that the species indicated retain a relatively high percentage of their predicted habitat capability may surprise some but it does reflect that wildlife concerns were considered in the design of the sale. It also reflects that only a relatively small percentage of the project area will actually be harvested (2-3%).

The exact number of large trees that will be left in units after logging is uncertain at this time. In units #4, #5, #6 and #7 one clump of merchantable green trees is being left for every 12 acres of harvest. These clumps consist of 3 to 8 trees. In addition, the logger will be encouraged to leave additional unmerchantable trees as long as safety requirements are met. I concur that

leaving larger trees will provide the overstory removal harvest method with greater above and below ground structural diversity over time and snags for wildlife.

Thank you again for your comments and suggestions about the DEIS. Please feel free to comment again on Stikine Area projects as your time and interest allows.



Abigail Kimbrell
Stikine Area Forest Supervisor

Stikine Area	
JUL 14 '93	
Forest Supv	
P.I.O.	
A.O.	
Eng. Staff	
F & WL Staff	
Planning Staff	
PL Staff	
S & W Staff	
Timber Staff	
Psdy. Dist.	
Wrang. Dist.	

Wrangell
Ranger District

JUL 14

Act.	
Dist. Ranger	
B.M.A.	
T.M. Oper.	
O.R.A.	
F&W	
Planning	
Engineering	
Log Acct.	
Resource Clerk	

P.O. Box 1511
Petersburg, AK 99833
July 12, 1993

attn of: I.D.T. leader, Bradfield timber sale
Stikine Regional Office
P.O. Box 309
Petersburg, AK 99833

To whom it may concern:

I am writing this to voice my concern about several issues regarding The Bradfield sale.

I object to the increase in volume of timber to be sold in the new preferred alternative. With the volume nearly doubled, the new preferred alternative is in effect a different one than originally proposed. I suspect the Forest Service has bowed to pressure from the logging industry at the expense of good forestry.

I object to the plan of 2 log transfer facilities in the same bay. I feel this will have a ~~cause~~ unnecessary negative impact on the ecosystem of the area, especially if logs are rafted instead of barged. Considering the other changes already made from the original plan, this is a real possibility.

I request the Forest Service stick to their word regarding no clear-cutting within 500 feet of inland wetland.

habitat. Some units now allow cutting
~~within~~ up to 100 feet of inland wetland
habitat, which would permanently alter
the associated ecosystems. In their
"New Perspectives" program to increase
public awareness and involvement, the
Forest Service endorsed the conclusions of
some of their most respected biologists
that clear-cutting does permanently alter
the forest's ecosystems.

I also want to voice my concern
about so much roading and logging in
an area of such unstable soil. I
request the Forest Service not road or
log any areas of unstable soil. The
long term effects of clear-cutting or logging
by helicopter ~~have~~ here on unstable
soil where rainfall and erosion is so
great are at best not good and at worst
could be disastrous.

In addition, I request the Forest
Service refrain from selling timber that
is winter range for mountain goats. Without
their winter range the goats cannot survive
a hard winter, or ~~several~~ series of hard
winters.

Please include this letter in all
documentation of public comment regarding
the Bradfield sale.

Sincerely, Eric Lee

United States
Department of
Agriculture

Forest
Service

Alaska Region Tongass National Forest
Stikine Area
P.O. Box 309
Petersburg, AK 99833

Reply To: 1950

Date: September 29, 1993

Eric Lee
P.O. Box 251
Petersburg, Alaska 99833

Dear Mr. Lee,

Thank you for taking the time to comment on the Campbell Timber Sale Draft Environmental Impact Statement (DEIS). I would like to take this opportunity to respond to your comments. My response will follow the key points you make in your letter and be published along with your letter in the Final Environmental Impact Statement (FEIS).

A proposed action is only one alternative to begin the planning process under NEPA and is usually derived before full analysis and public involvement. It is simply a starting point and the sale volume is simply one of the descriptors. Alternatives to the proposed action that satisfy the purpose and need are also examined under NEPA. Additionally, a "proposed action" is not the same as a "preferred action" under NEPA. The objective for any NEPA analysis is established in purpose and need statement. In this case the purpose and need was identified as "to consider specific alternatives to harvest timber within the project area given the guidance in the Tongass Land Management Plan." In this case I was interested in examining the capability of the area to support timber harvest and exploring different approaches that might arise from an "ecosystems look" at the project area. Accordingly, it was appropriate to develop a range of alternatives that resulted in different harvest levels.

However, there were several changes between the Draft and Final EIS which reduced the predicted volumes of all alternatives. More field reconnaissance revealed that two of the units were infeasible and there were some changes in harvest prescriptions and sizes. The volumes in the FEIS now range from 7 MMBF to 20.5 MMBF. The alternative with the most harvest (Alternative E) is very important to the range of alternatives because it shows me the effects of harvesting in Tom Creek and the maximum harvest achievable. The selected alternative (Alternative P) harvests 11.6 MMBF and was specifically formulated from public comment.

Unfortunately, two to three LTFs would be necessary to log the Campbell area because building roads to connect all helicopter landings to one LTF would be

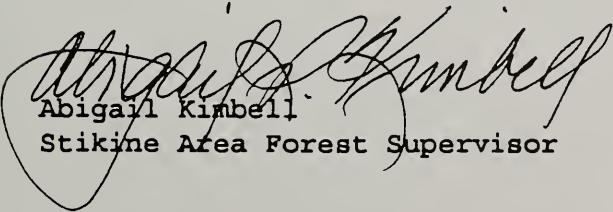
impossible or cause substantial adverse effects to the upland environment. The terrain is very limiting and road building is difficult. In fact, the best LTF site is located in the Tom Creek watershed where upland resource values are the greatest. Therefore, I chose not to log this watershed. The selected alternative (Alternative P) only develops the West Face LTF site based on comments on the draft and recommendation made by the Fish and Wildlife Service, ADEC, ADF&G.

Inland wetland habitat was defined in the glossary as inclusive of a 500 foot distance around 10 acre or greater lakes, beaver ponds, marshlands and associated grass/sedge meadows. This is a definition, not a requirement for management. However, none of these areas as defined, will be impacted by the selected alternative.

The few areas of proposed timber harvest and road building on high hazard soil under some alternatives, were investigated in the field by a soil scientist and appropriate mitigation measures have been applied which we believe will reduce the risk of adverse impacts. Such mitigation includes full suspension of logs by helicopter yarding and the application of the overstory removal prescription rather than clearcut to maintain rooting strength in the soil. The selected alternative does not construct roads.

Units #1, #2 and the west half of unit #3 were dropped in the formulation of the selected alternative after consultation with our own biologists, ADF&G and the Fish and Wildlife Service when comments were received on the DEIS. Although I understand that you feel that none of the goat habitat should be harvested, I believe that this strategy adequately responds to the need to protect this type of habitat within the WAA (the landscape scale) and the VCU (the project scale). There is a total of 3822 acres of high value goat winter range in the WAA and 1092 acres in the VCU. Some of the best of this habitat is adjacent to saltwater where maritime influences seem to reduce snowloads over similar interior areas. There are 1450 acres of saltwater facing high value goat winter range in the WAA and 670 acres in the VCU. The largest contiguous block of this habitat in the WAA is 660 acres and occurs on the West Face and the adjacent Marten Creek VCU. The selected alternative would harvest 19 acres (3%) from the fringes of this block, leaving the rest intact and minimizing any potential problems with utilization of the rest of the block. The selected alternative would harvest a total of 95 acres of high value goat winter range, leaving 97% of this habitat in the WAA and 91% in the VCU. Most of this remaining habitat is not scheduled for harvest either in the current Forest Plan or the preferred alternative in the revision.

Again, thank you for your suggestions and comments. We look forward to hearing from you again during the planning process of projects on the Stikine Area.



Abigail Kimbell
Stikine Area Forest Supervisor

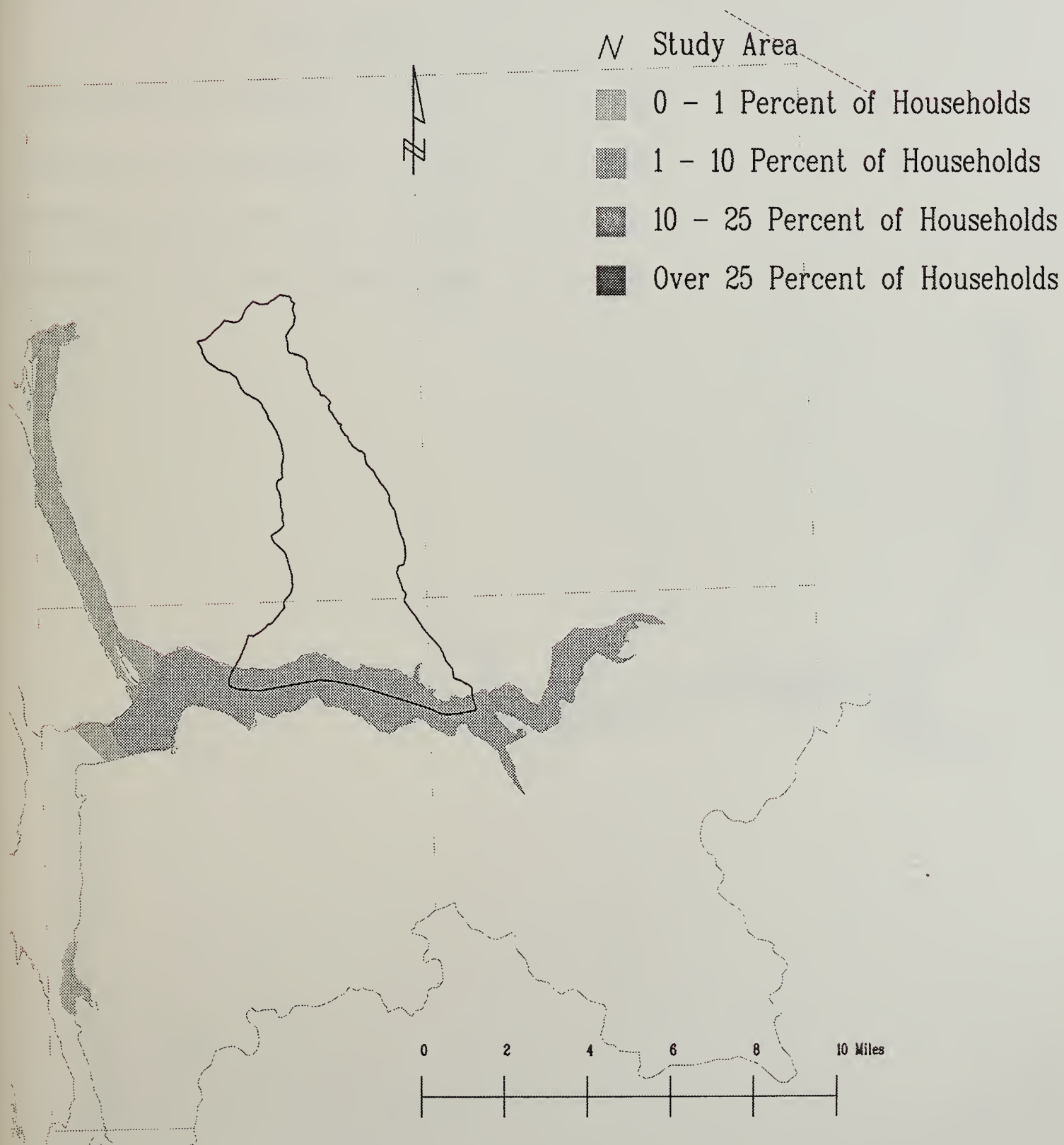


Appendix D

TRUCS Maps

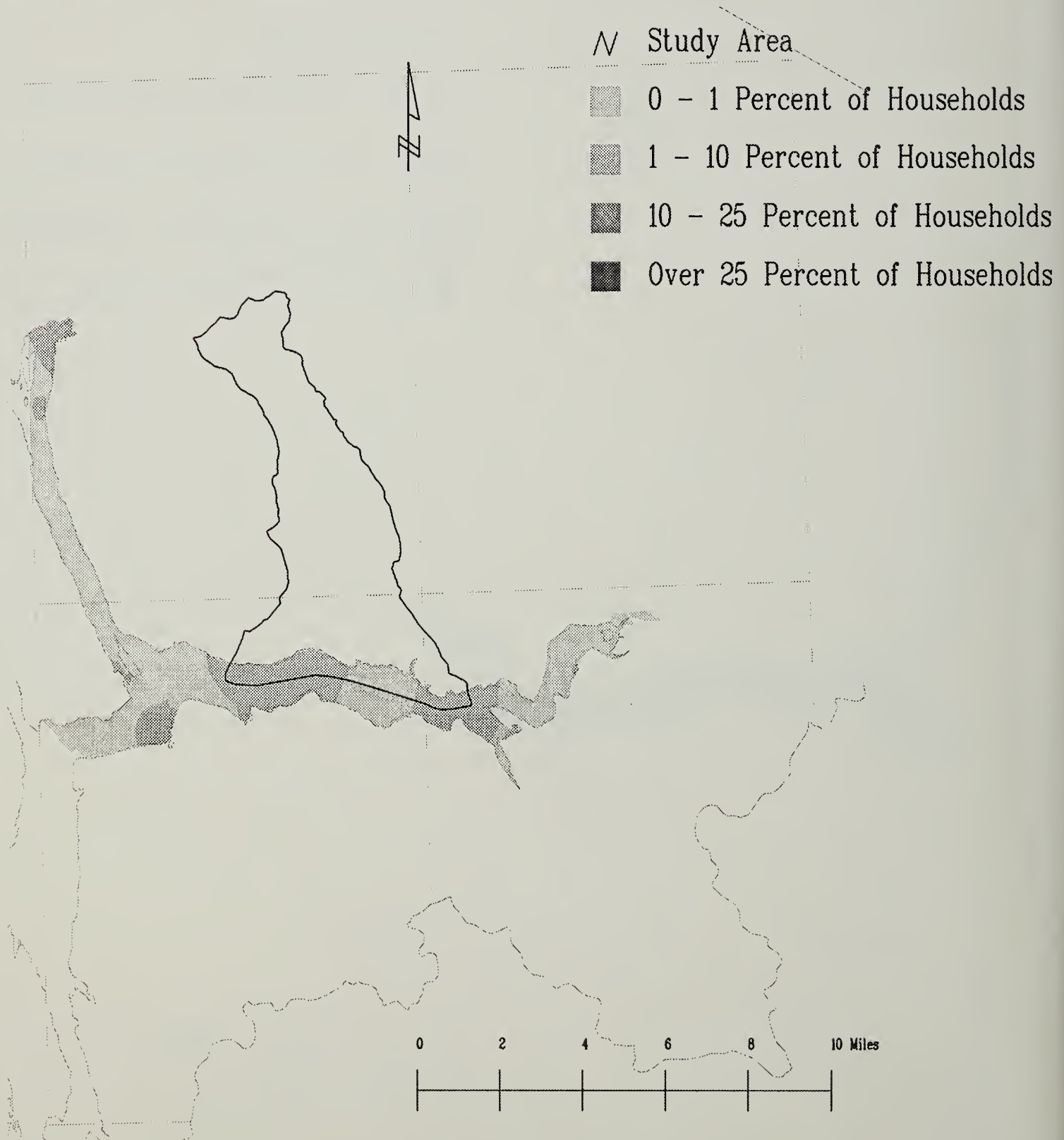
Campbell River TRUCS Data

Wrangell Community Marine Mammals



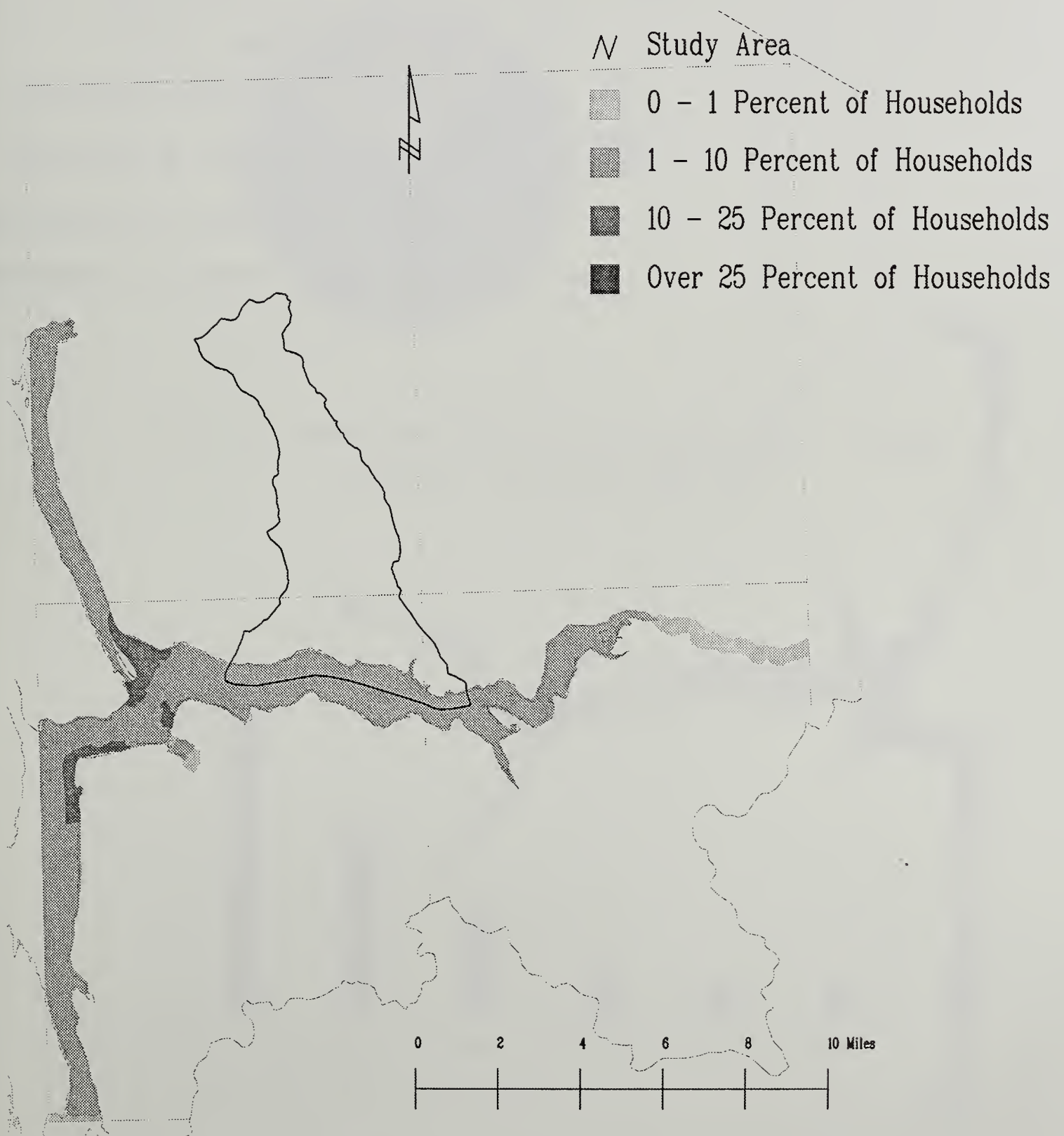
Campbell River TRUCS Data

Wrangell Community Invertebrates



Campbell River TRUCS Data

Wrangell Community Salmon Fishing



Campbell River TRUCS Data

Wrangell Community Other Finfish

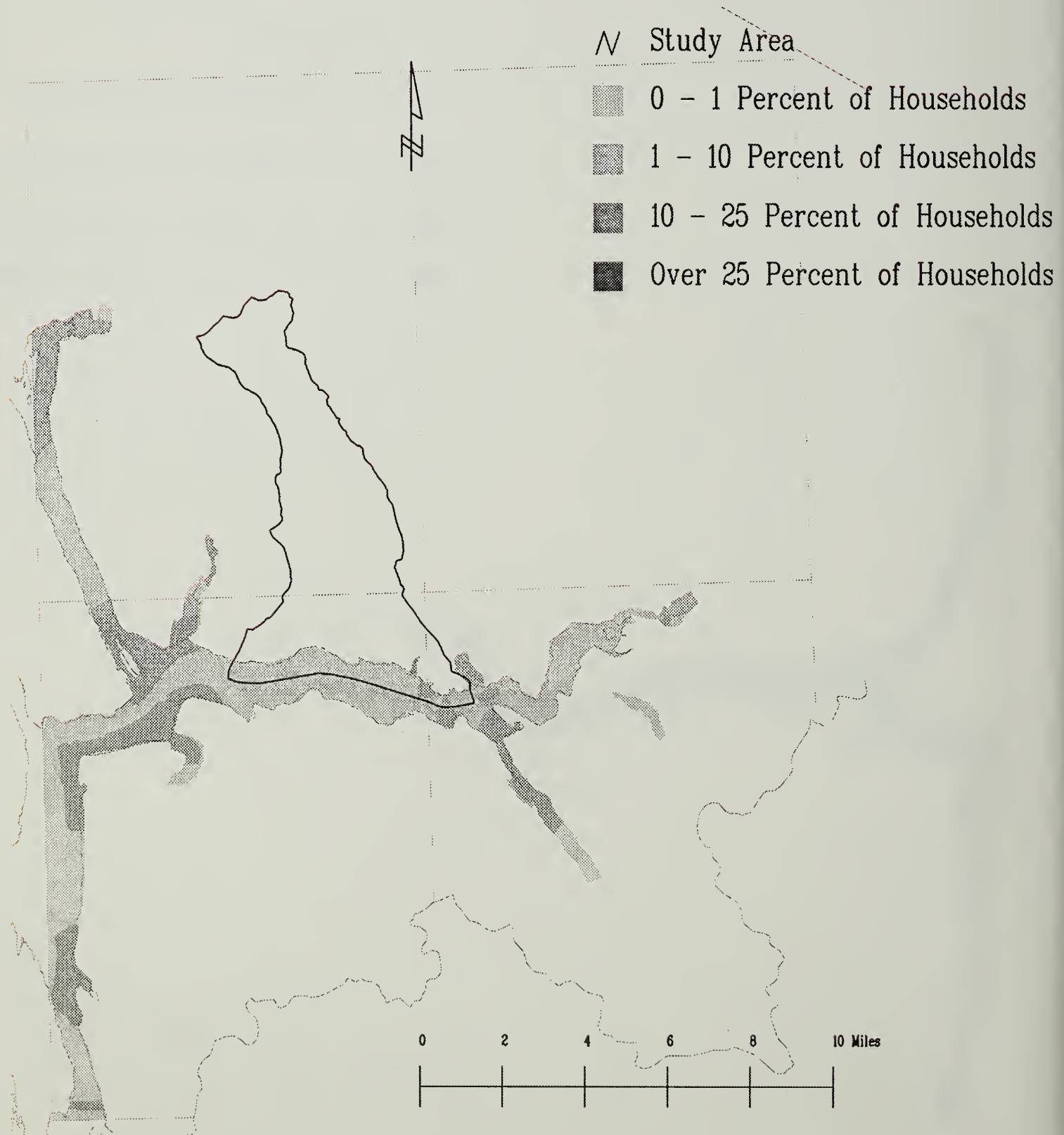


Figure 5. Distribution of resource use by Wrangell residents.
Data from Cohen 1989.

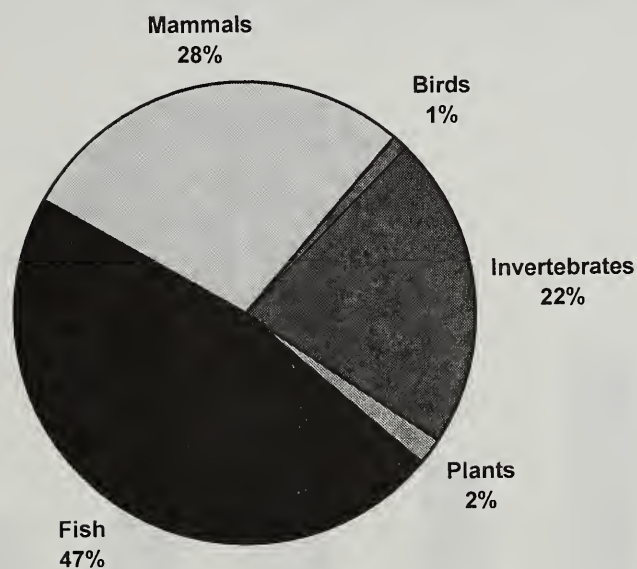


Figure 6. Pounds per capita harvest of mammals by Wrangell residents. Data from Cohen 1989.

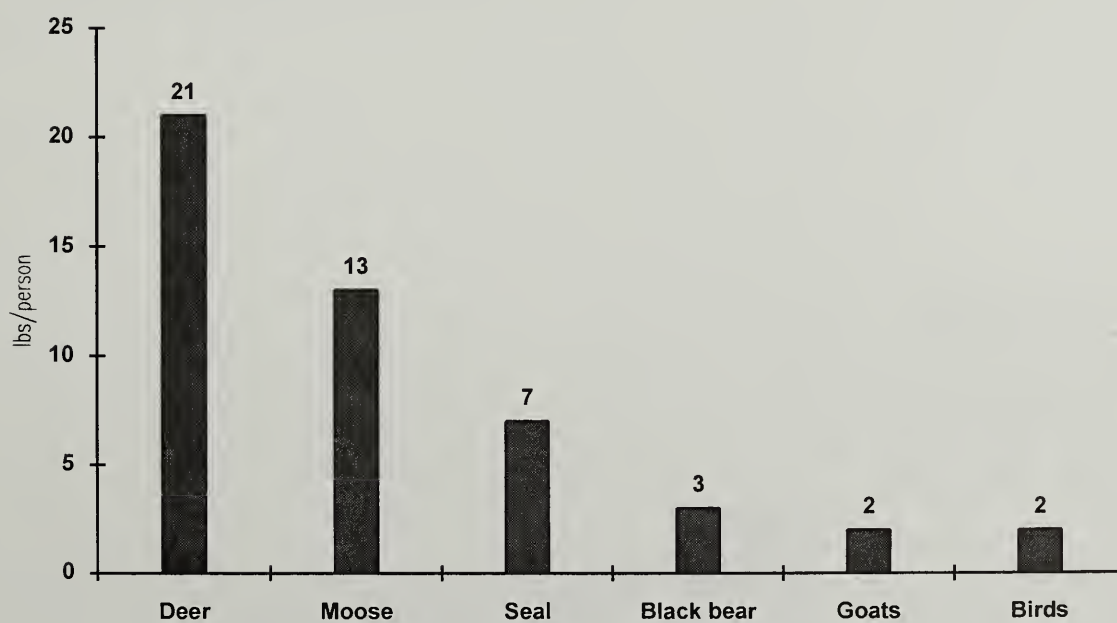


Figure 7. Marine invertebrates and fish harvested by Wrangell residents. Data from Cohen 1989.

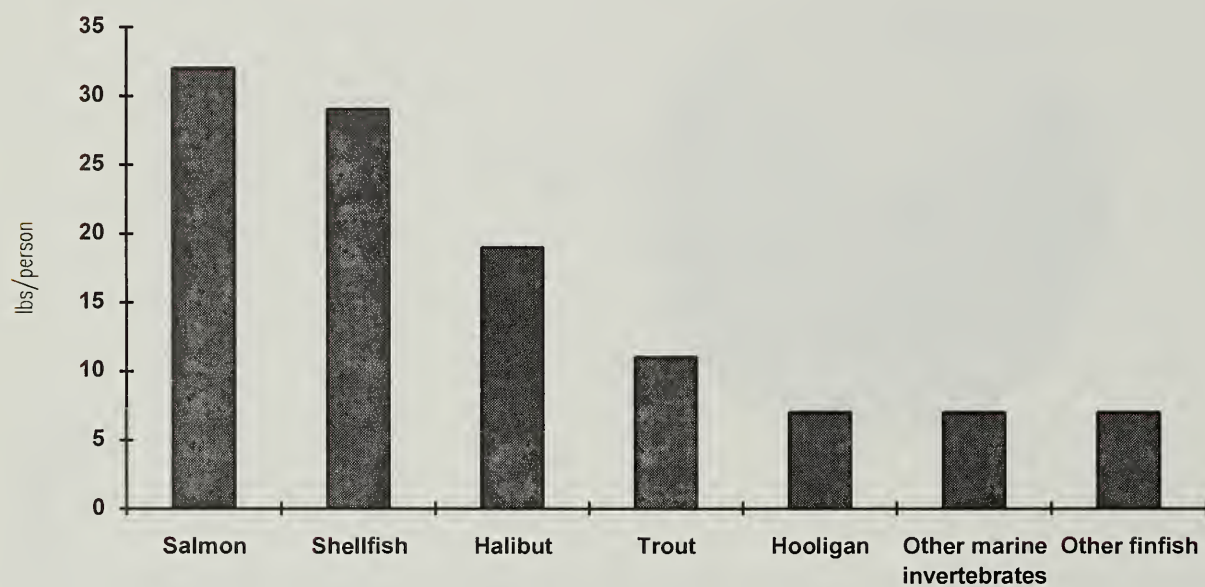


Figure 8. WAA 1812 Estimated Deer Harvest and Demand

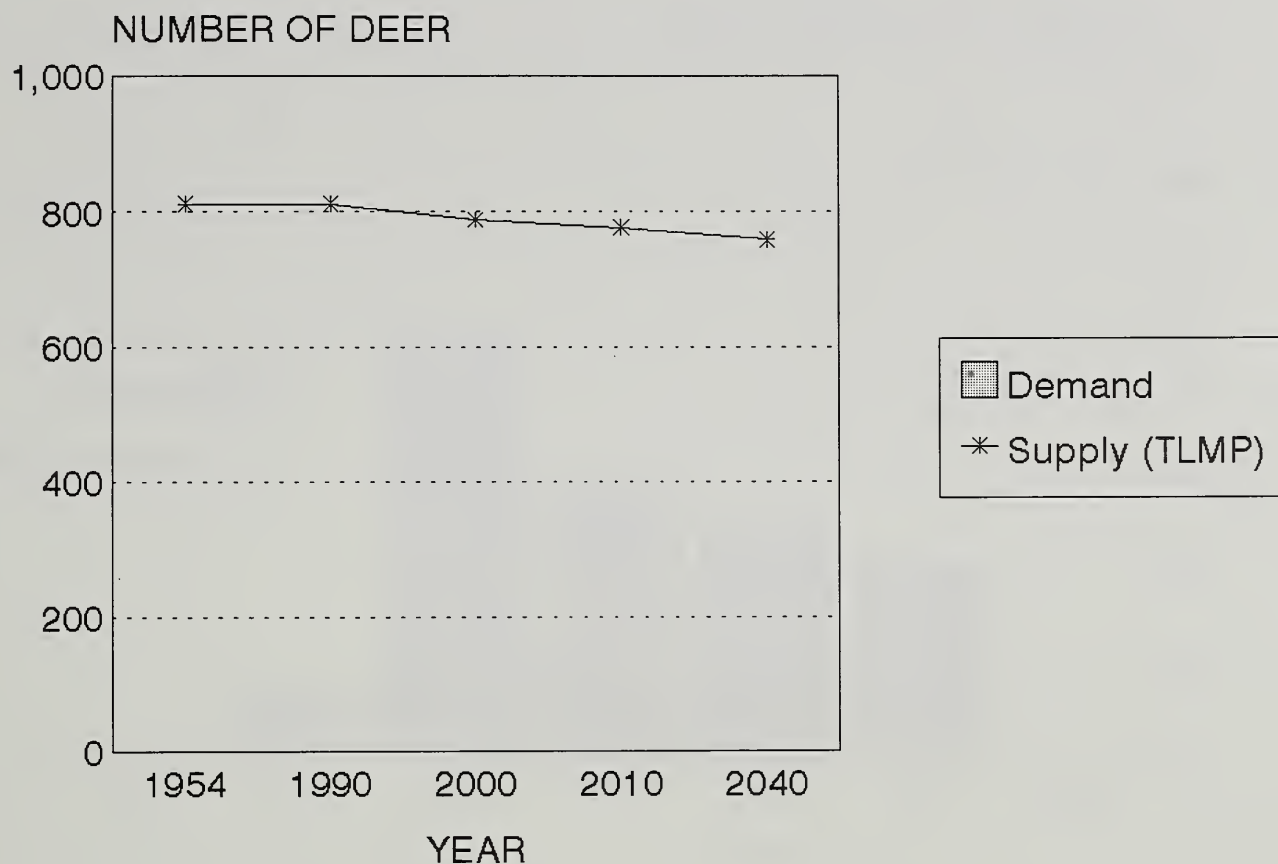


Figure 9. WAA 1812 Estimated Mountain Goat Supply and Demand

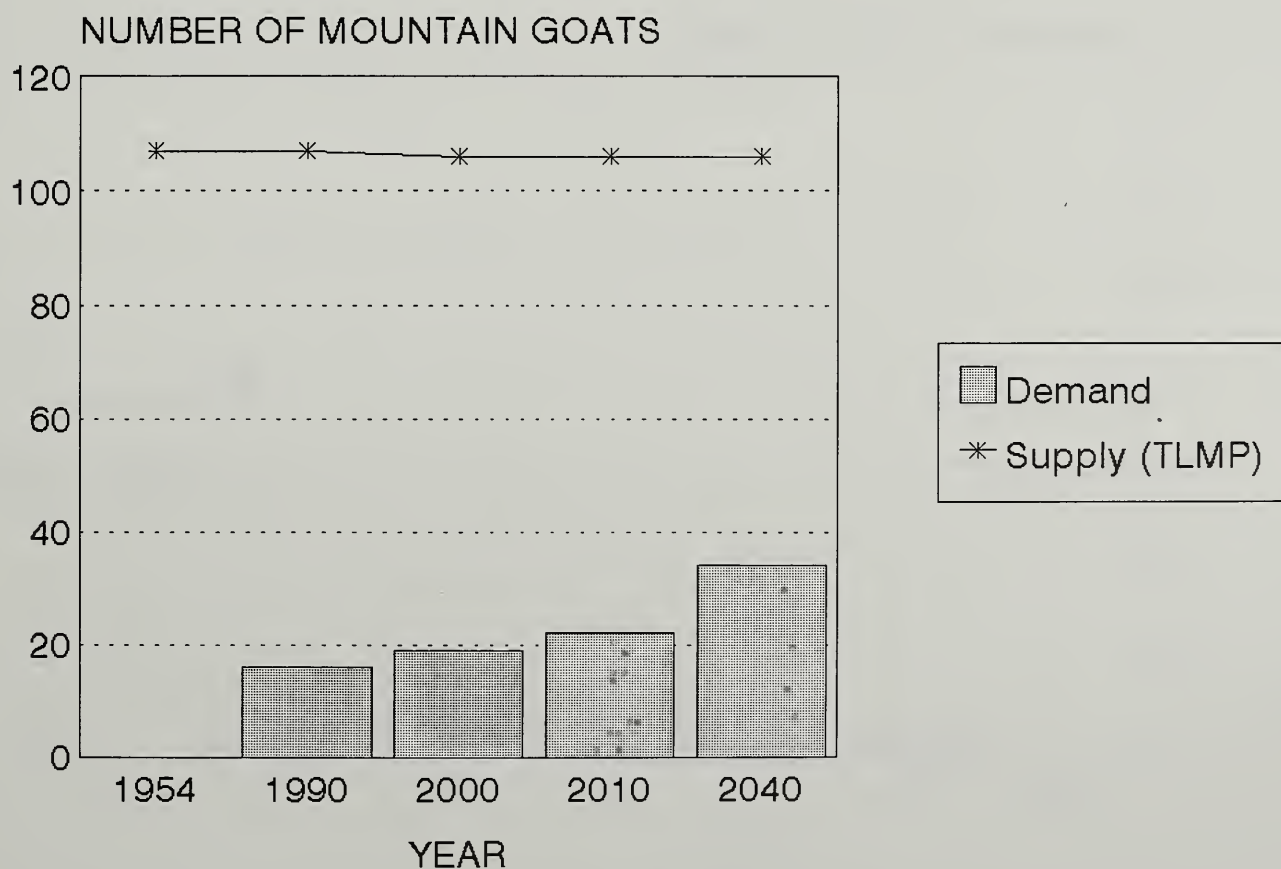


Figure 10. WAA 1812 Estimated Brown Bear Supply and Demand



Figure 11. WAA 1812 Estimated Black Bear Supply and Demand

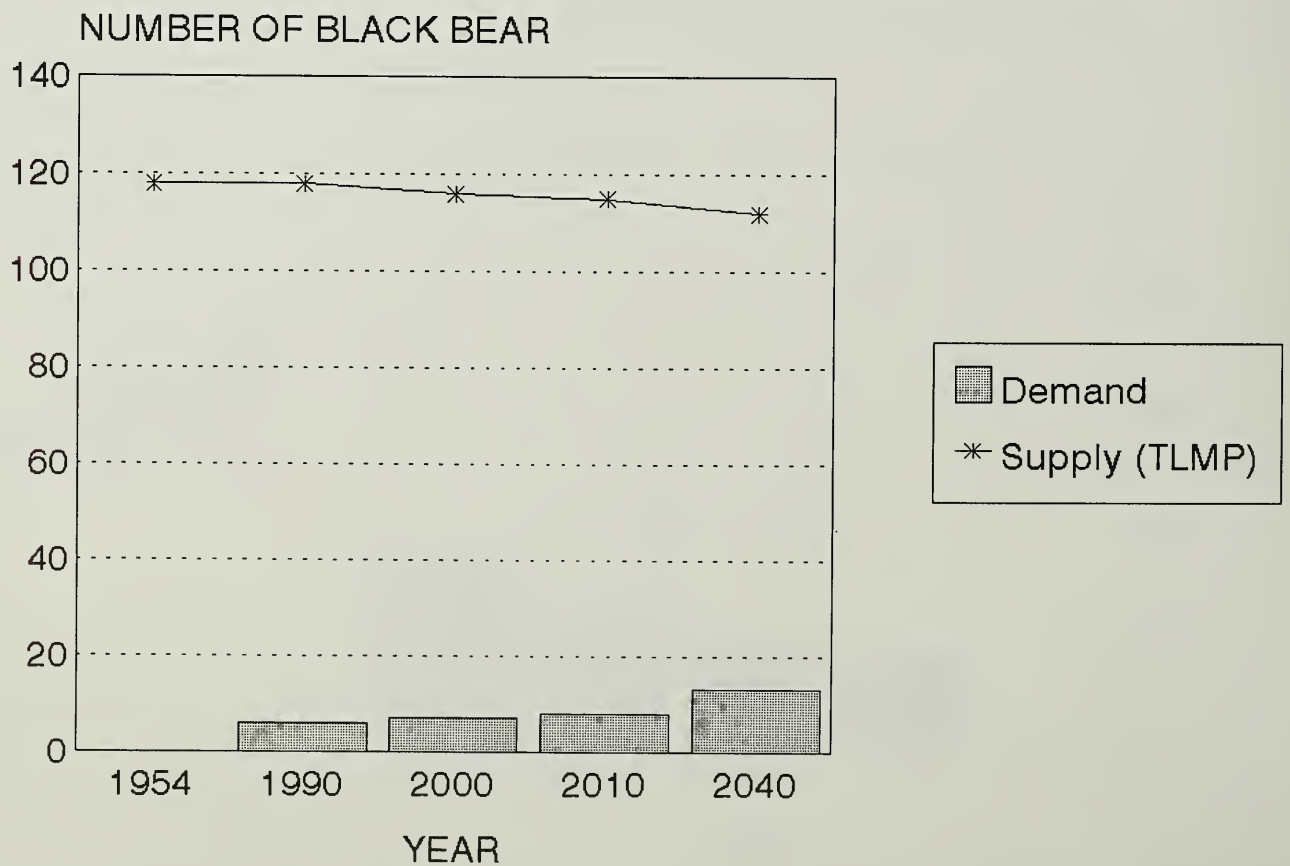


Figure 12. WAA 1812 Estimated Marten Supply and Demand

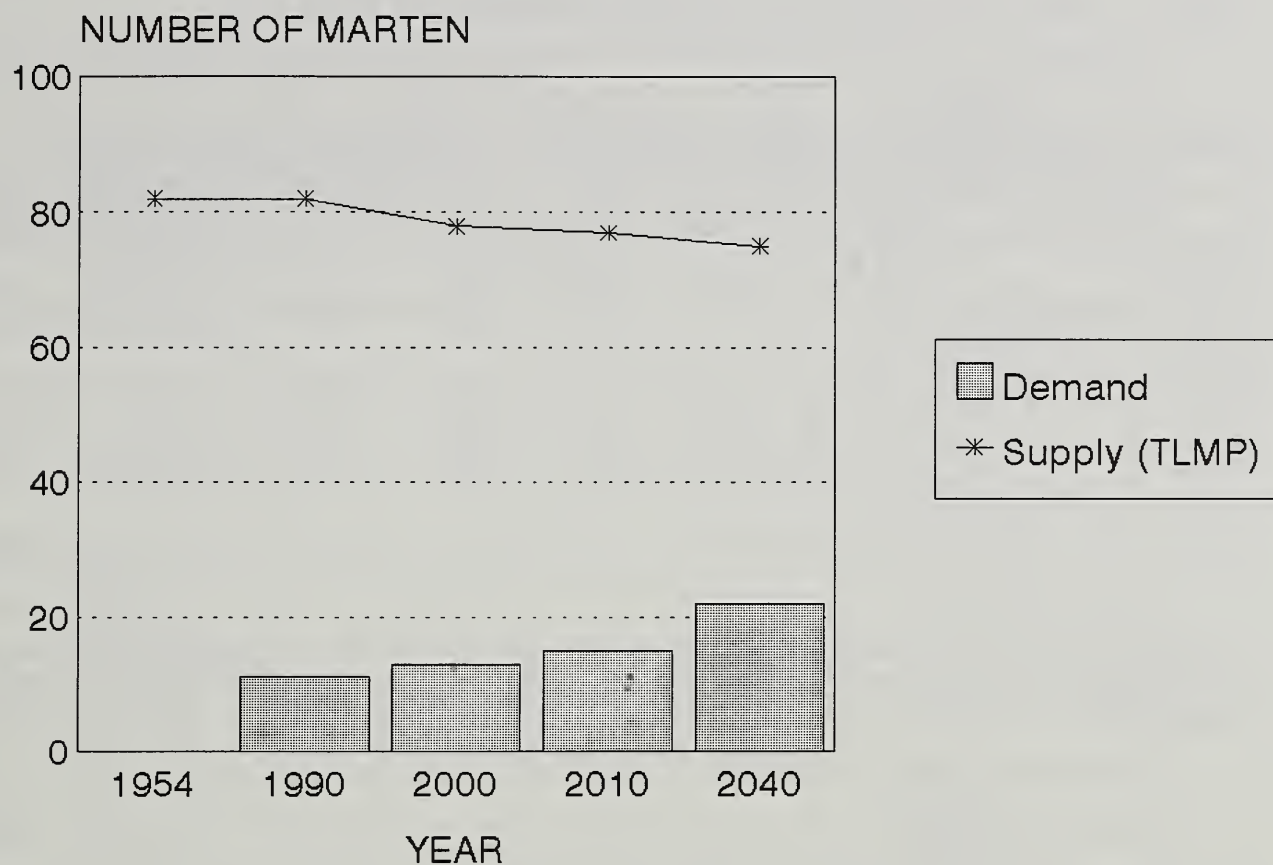


Figure 13. WAA 1812 Estimated River Otter Supply and Demand

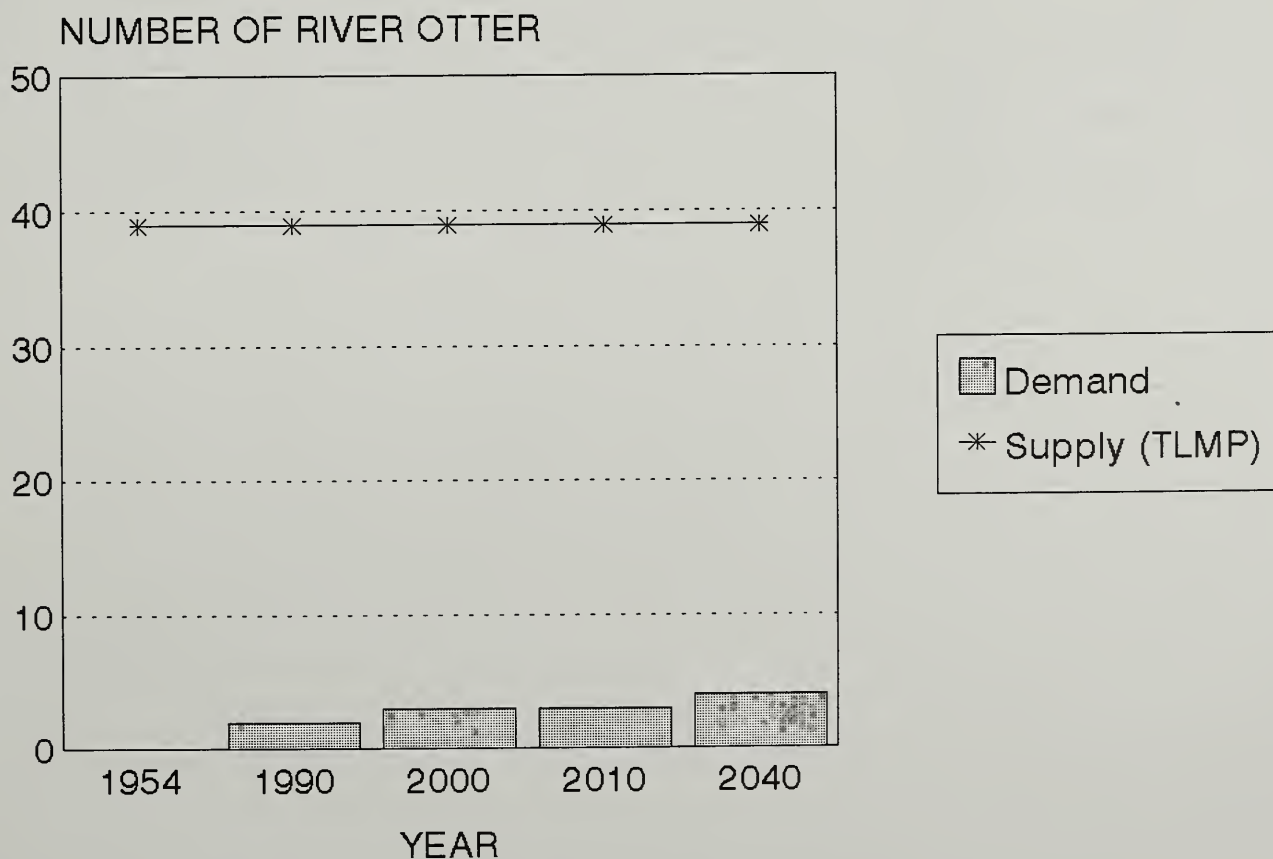


Table 1. Harvest demand and estimated habitat capability for WAA 1812.

Species	Annual Harvest (from TLMP SDEIS)	Population Needed**				Estimated Habitat Capability (from TLMP SDEIS preferred alt)			
		1990	2000	2010	2040	1990	2000	2010	2040
Brown Bear	0.4	10	12	14	22	30	30	30	30
Black Bear	0.4	6	7	8	13	118	116	115	112
Deer	0.0	0	0	0	0	812	789	777	759
Goat	1.1	16	19	22	34	107	106	106	106
Marten	4.1	11	13	15	22	82	78	77	75
River Otter	0.75	2	3	3	4	39	39	39	39

** Assume harvest rate of 4% for Brown bear, 7% for black bear, 10% for deer, 7% for goats, 40% for Marten and 40% for river otter. Demand for all species increases by 18% per decade through 2010 and 15% per decade through 2040.

WAA	Location	GMU	Mean Annual Harvest	% Community Harvest	Cumulative % Harvest	Timber Sale , Year & MMBF
1904	Woronkofski & Stikine Mouth	3	76	22.6	22.6	Woronkofski, 98, 10mmbf
1530	Exchange Cove Whale Passage POW	2	1	15.1	37.7	KPC Central POW Lab Bay
1905	Zarembo Island	3	31	9.2	46.9	Deep Bay N&S, 93, 92, 12 11 mmbf South Zarembo, 2000, 10mm/Nesbitt Reef, 2000, 10mm
1903	Wrangell Island	3	23	6.8	53.7	Shooter, 92, 1.2mm Twin, 92, 3.2mm Midpoint, 93,5mm Blake, 98, 10mm
1906	Kashevarof Island	3	22	6.5	60.2	None planned
3733	Whale Bay Drainage Wilderness Coast	4	17	5.0	65.2	None planned, designated wilderness
1910	S. Etolin Isl.	3	16	4.7	69.9	Whaletail, 2001, 10mmbf
1528	Salmon Bay POW	2	10	3.0	72.9	Lab Bay
3731	Kelp Bay, Takatz Bay	4	7	2.1	75.0	APC Kelp Bay #2, 2005, 98mmbf
3938	Gambier Bay Drainage	4	7	2.1	77.1	None planned, designated wilderness
3002	Sitka road system	4	6	1.8	78.9	APC, NW Baranoff, 96, 127mmbf
3734	S. Baranof Island	4	6	1.8	80.7	None planned
1319	Thorne R.	2	5	1.5	82.2	KPC, CPOW
1420	Coffman Cove, Luck Lake, Ratz Harbor	2	5	1.5	83.7	KPC, CPOW, 93
1529	Mt. Calder, Red Bay, Pt. Protection	2	5	1.5	85.2	Lab Bay
3311	Ushk Bay, Kakul Narrows	4	5	1.5	86.7	Ushk Bay APC, 94, 89mmbf
3313	Rodman & Saook Bay Drainages	4	5	1.5	88.2	Kelp Bay #2, APC, 2005, 98mmbf
3940	Pt. Gardner, Eliza Harbor	4	5	1.5	89.7	None planned, designated wilderness

WAA	Location	GMU	Mean Annual Harvest	% Community Harvest	Cumulative % Harvest	Timber Sale , Year & MMBF
1901	N. Etolin Isl	3	4	1.2	90.9	Starfish, 92, 41mmbf King George, 95, 30mmbf, Honeymoon, 95, 15mmbf Mosman, 99, 15mmbf, Burnett, 99, 15mmbf
3001	Nakwasina, Neva Strait	4	4	1.2	92.1	APC Ushk, 94, 89mmbf, NW Baranof, 96, 127mmbf
3314	Fish Bay Drainage	4	4	1.2	93.3	NW Baranof, 96, 127mmbf
1525	S.Kosciusko Island	2	3	0.9	94.2	N. Sea Otter Sound, 92
1318	Craig, Klawock	2	2	0.6	94.8	
1323	Western POW	2	2	0.6	95.4	
1422	Staney Crk, Naukati, Sarkar	2	2	0.6	96.0	CPOW
1526	Holbrook, North Kosciusko Island	2	2	0.6	96.6	None Planned
1531	Tuxekan, Marble Sea Otter Sound	2	2	0.6	97.2	N. Sea Otter Sound, 92
1810	Virginia Lake, Garnet Mtn	1B	2	0.6	97.8	Mad Critter, 97, 30mmbf
4041	Whitewater Bay, Wilson Cove	4	1	0.3	98.4	None planned, designated wilderness
1003	Hecta Island	2	1	0.3	98.7	
1316	Karta Bay	2	1	0.3	99.0	Wilderness
1421	Sweetwater Lake Logjam Crk	2	1	0.3	99.3	CPOW
1707	North Arm Stikine River	1B	1	0.3	99.6	None planned, designated wilderness
1816	Seward Passage	1B	1	0.3	99.9	Frosty Bay, 92, 30mmbf
1902	Deer Island	3	1	0.3	100.2	Kaukan, 99, 10mm
3308	Kook Lake, Sitkoh Bay, False Island	4	1	0.3	100.5	S.E. Chich #2, 2006, 97mm
3312	Duffield Peninsula, Bear Bay	4	1	0.3	100.8	NW Baranof, 96, 127mm
3939	Pybus Bay Drainage	4	1	0.3	101.1	None, wilderness
		TOTAL	337			
1812	Campbell TS, Marten Crk, Harding River	1B	0	0		Campbell TS, 1993, 12mmbf

CPOW Central Prince of Wales Island

POW Prince of Wales Island

KPC Ketchikan Pulp Company

APC Alaska Pulp Company

Appendix E

LTF Dive Report



IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Southeast Alaska Ecological Services

3000 Vintage Park Blvd., Suite 201

Juneau, Alaska 99801

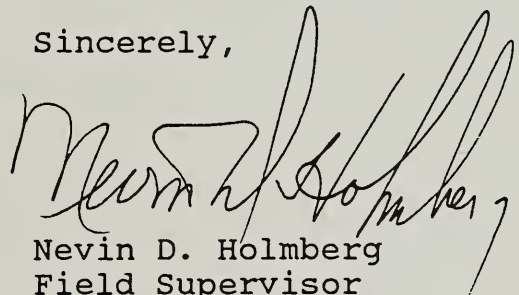
Ms. Meg Mitchell
Campbell Interdisciplinary Team
P.O.Box 51
Wrangell, AK 99929

August 12, 1992

Dear Ms. Mitchell:

Enclosed is the report with recommendations for the dive investigation U.S. Fish and Wildlife Service biologists Bill Hughes and Carol Hale conducted at two log transfer facilities at the Campbell Timber Sale area on June 29, 1993 per your request. If you need any clarification of these data please call Carol Hale at 586-7240.

Sincerely,



Nevin D. Holmberg
Field Supervisor

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Evaluation of Proposed Log Transfer Facility
Sites for Campbell Timber Sale near Wrangell, Alaska

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At the request of Meg Mitchell, U. S. Forest Service (USFS) Wrangell, Alaska, the U. S. Fish and Wildlife Service investigated two proposed log transfer facility (LTF) sites in Bradfield Canal near Wrangell, Alaska. (Figure 1). The LTF sites would be developed in conjunction with a USFS proposed Campbell Timber Sale. The field investigations were conducted on June 29, 1993.

Wetlands and deepwater habitats are essential breeding, rearing, and feeding grounds for many species of fish and wildlife. The transfer and storage of logs in marine waters can result in significant impact to these resources. The inadvertent discharge of bark and other woody debris during log transfer and storage operations can result in significant accumulations of organic material which smother benthic organisms and marine plants. The fate of dislodged bark is dependent on numerous variables, but typically tends to accumulate in, or adjacent to, areas of high log handling activity. Tideland fills required for construction and operation of LTFs can also cover and destroy productive shallow water estuarine and marine resources.

OBJECTIVES

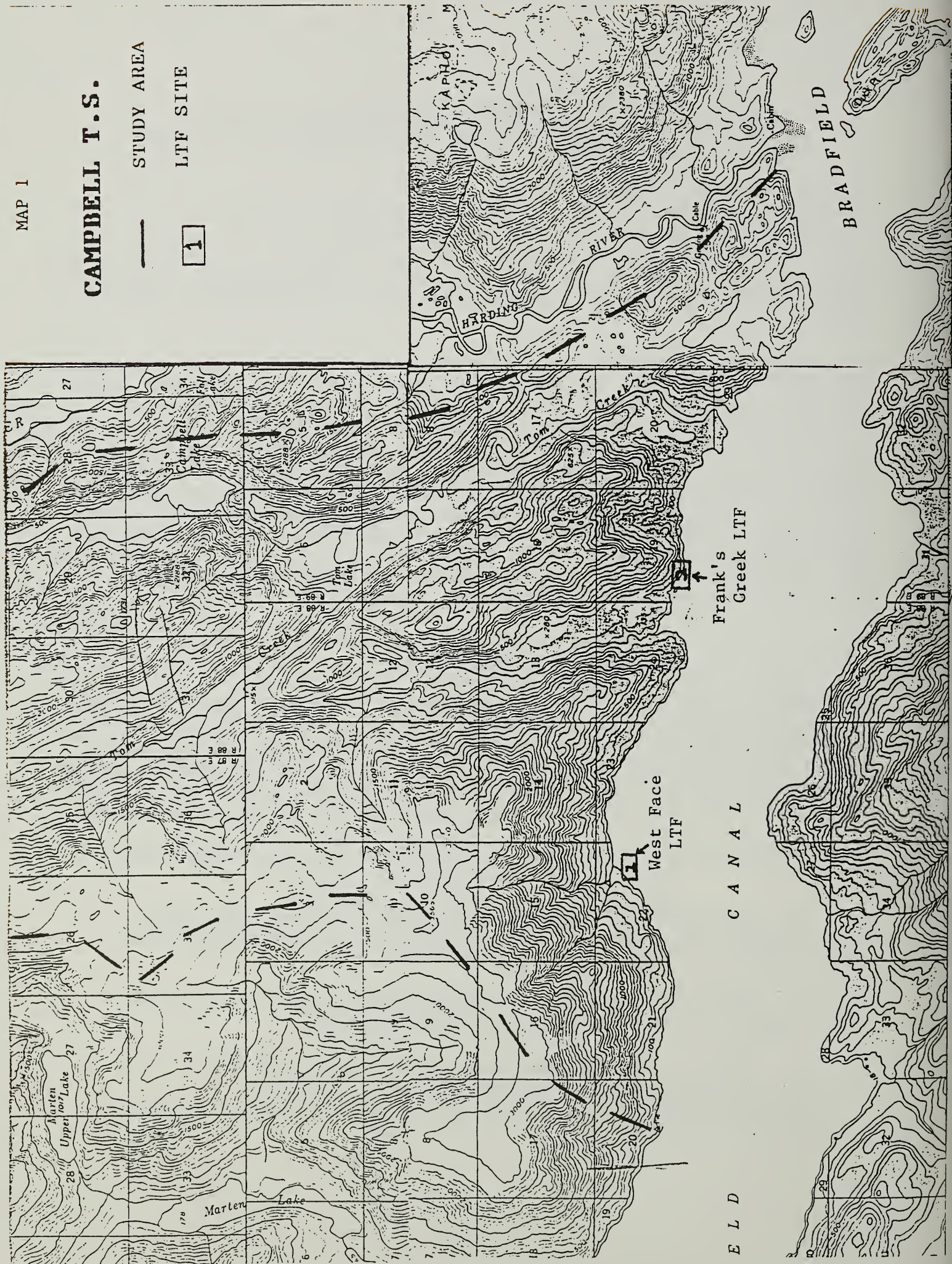
The adverse effects of concentrated bark deposits and tideland fills to productive shallow water habitats can be mitigated by selecting sites 1) where physical conditions facilitate bark dispersal to deeper less productive waters, and 2) which display relatively low biological resource value. Our site evaluation techniques are designed to meet the criteria of both approaches.

These surveys were directed at achieving the following objectives:

1. Investigate intertidal and shallow subtidal habitats at the proposed LTF to determine the physical and biological characteristics of the site.
2. Evaluate the proposed development using the Alaska Timber Task Force (ATTF) LTF guidelines.¹
3. Present recommendations regarding suitability of the site for use as an LTF and/or recommend alternatives or mitigative measures to minimize adverse effects to fish and wildlife values.

Figure 1.

Dive Site Locations for Campbell Timber Sale LTF Investigations



METHODS

A 100-meter long Keson fiberglass transect tape was set perpendicular to the shoreline from the approximate high tideline and extended seaward to the end of the tape or to a maximum water depth of 21 m. Due to access problems, the transect at the Franks Creek site was run seaward from the height of tide at the time of the survey (approximate 2-m tidelevel, referenced to MLLW). Divers swam along the transect line and recorded water depth, substrate composition, taxa and general distribution of plant and animal life at 5 - 10 meter intervals. All underwater work was conducted with sport diving SCUBA gear. Observations were recorded on waterproof paper. Water depth measurements were made with a US Divers Monitor 2 diving computer. Depth measurements were corrected for stage of tide and referenced to the approximate mean higher high water (MHHW) tideline for the Bradfield Canal area.

Upon completion of the transect survey, divers conducted a general reconnaissance dive on either side of the transect to observe the presence and distribution of marine life and habitat values that may not have been observed along the actual transect.

RESULTS

West Face: The proposed LTF (Figure 1) would be located on relatively steep boulder-cobble intertidal area within about 50 meters of a small stream. The stream had an estimated discharge of 3 to 5 cfs at the time of the survey. Although the stream gradient is quite steep, it is reported to provide some habitat for anadromous and resident salmonids. Alluvial materials have built a small cobble-gravel delta that laterally grades into the rocky cobble-boulder fiord shoreline of Bradfield Canal.

The slope of the intertidal beach area (Figure 2) is moderate. However, the subtidal area drops off very abruptly, reaching a depth of 23 m (ref. to MHHW) about 67 meters from the high tide line. Maximum depths in Bradfield Canal are in excess of 150 m.

The general wetland habitats, as defined by Cowardin, et al², at the site are classified as estuarine. Specific classes of wetlands include:

<u>Wetland Area/Zone</u>	<u>Wetland Class</u>
Upper and mid-intertidal	Rocky shore
Lower intertidal	Unconsolidated vegetated shore
Upper subtidal	Unconsolidated vegetated bottom
Lower subtidal	Unconsolidated bottom

Figure 2. Dive Transect Depth-Distance Profile for West Face Log Transfer Facility.

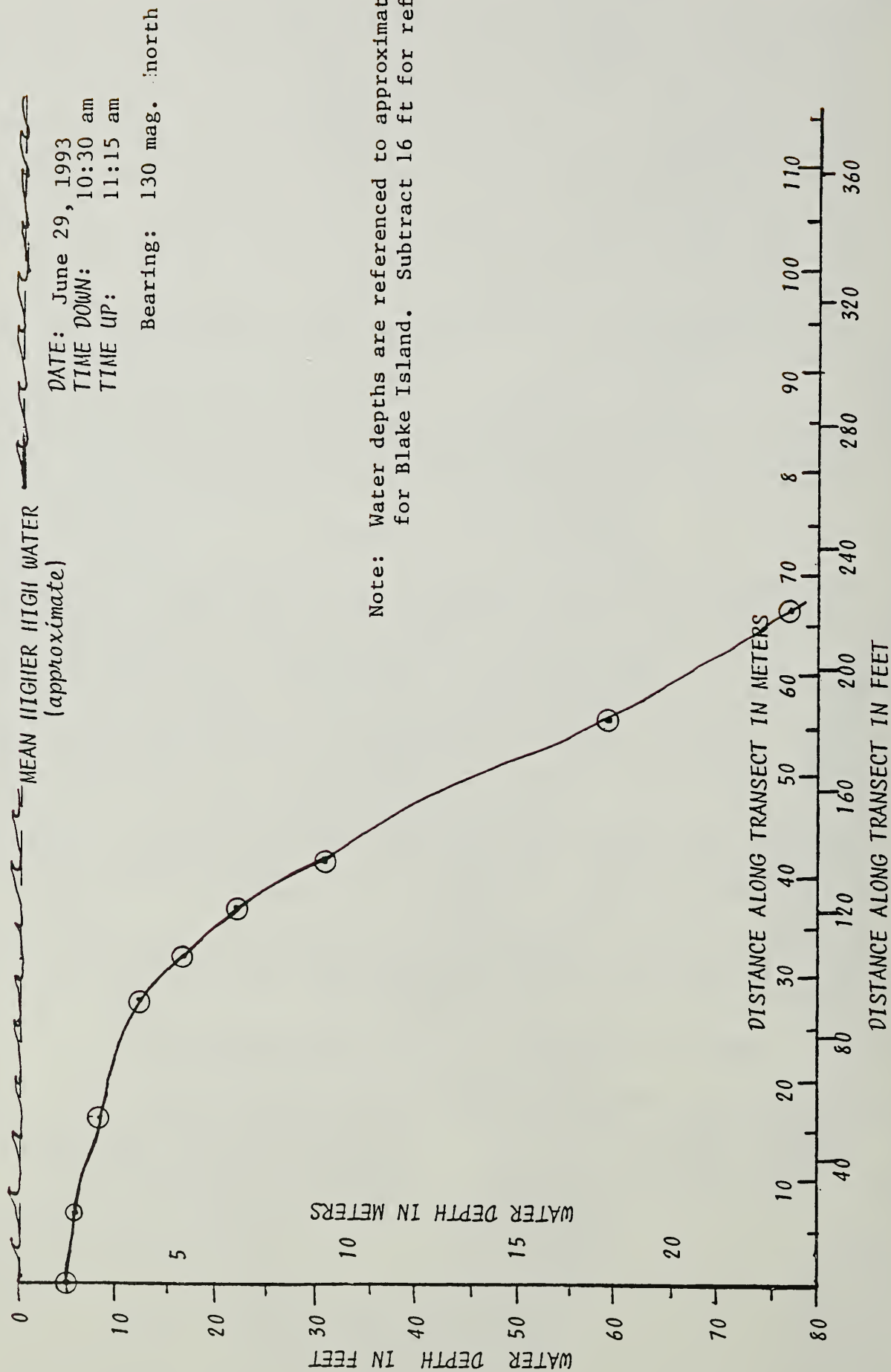
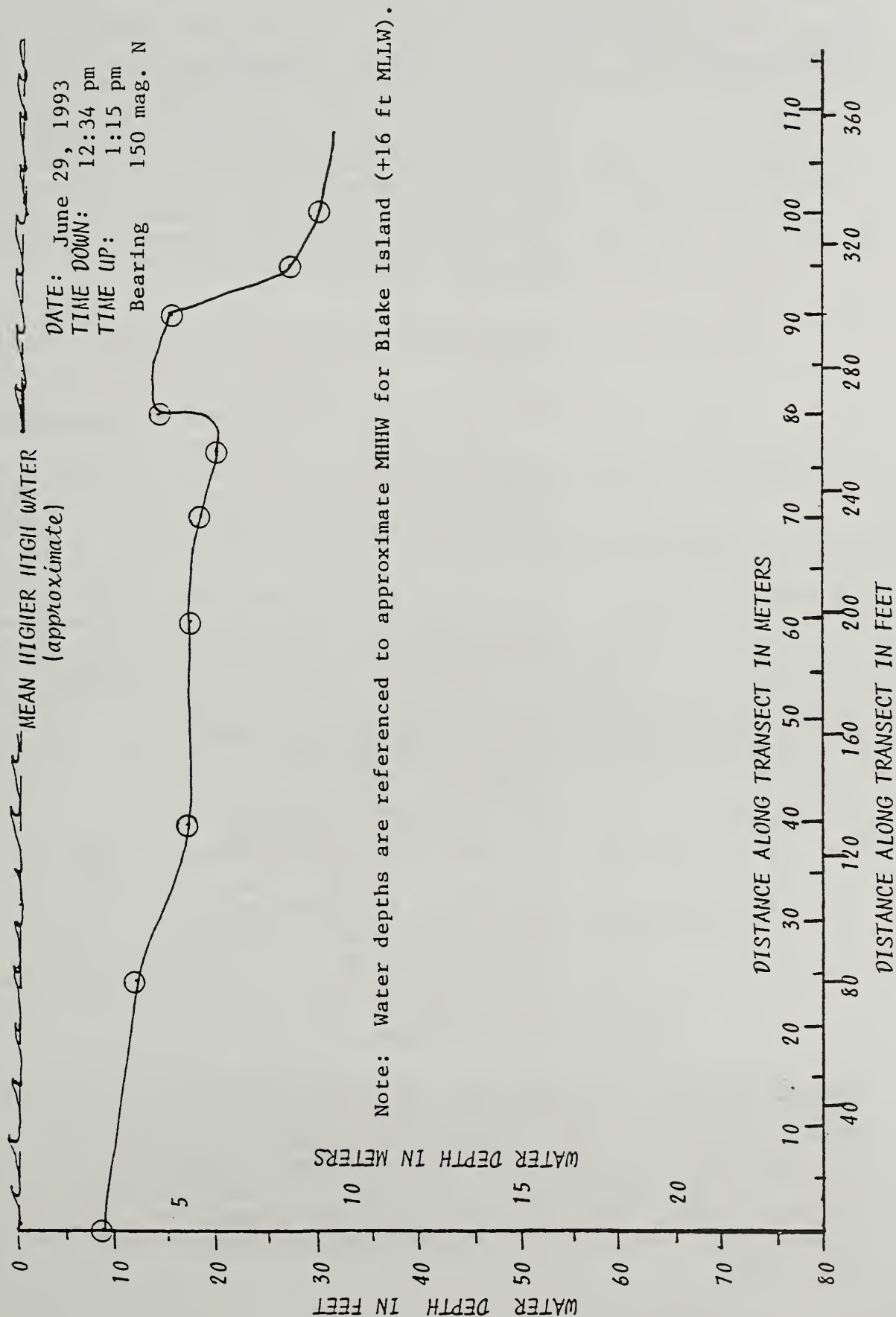


Figure 3 .Dive Transect Depth-Distance Profile for Franks Creek Log Transfer Facility.



A brief description of the conspicuous plants and invertebrate species observed along the transect follows:

<u>Distance Along Transect</u>	<u>Comments</u>
0 - 32 m	Substrate in the intertidal area is primarily cobble-boulder. Rockweed (<u>Fucus</u> sp.) covered much of the mid and lower intertidal area. Densities ranged from sparse to very dense. The mid to lower intertidal (27 -32 m) had profuse growths of blue mussel (<u>Mytilus edulis</u>) and balanoid barnacles.
32 - 37 m	The bottom slope became very steep; substrate composition graded from cobble to silt. Vegetation consisted of moderately dense growths of unidentified filamentous green and red algae and sea lettuce (<u>Ulva/Monostroma</u>).
37 - 42 m	Silty substrate with large brown kelps (<u>Laminaria</u> sp.) attached to shell debris and occasional larger-sized granular substrate material.
42 - 59	Very fine silty substrate with scattered shell debris. Benthic macroinvertebrates were moderately abundant and representative of subtidal habitats with moderate current and flushing. Filter feeders include sea peach (<u>Halocynthia aurantium</u>), sea squirt (<u>Ascidia paratropa</u>), sea plume (<u>Ptilosarcus gurneyi</u>), serpulid polychaetes, anenome (<u>Cribriniopsis fernaldi</u>), clams (<u>Saxidomus</u> sp. and <u>Mya truncata</u>). Although not abundant, the brittle star, <u>Ophiolus</u> sp., was present. Higher order scavengers and predators include Dungeness crab (<u>Cancer magister</u>), lyre crab (<u>Hyas lyratus</u>), starfish (<u>Pycnopodia</u> sp. and <u>Evasterias</u> sp.). Dungeness crab are usually associated with the subtidal habitat found near stream or river mouths.

Franks Creek: The proposed LTF site (Figure 1) is located in a small rocky cove just east of the mouth of Franks Creek. A depth-distance profile along the transect is presented in Figure 3. The cove is very shallow, reaching a depth of 9 m (ref. MHHW) at 100 meters from shore. At low tide the substrate at the extreme end of the transect would be covered by only 4 m of water; the rock outcrop observed at 90 meters would be exposed at low tide.

The subtidal substrate graded to silt and sand at the seaward end of the transect. The habitat is probably contiguous with the alluvial area at the mouth of Franks Creek. Juvenile Dungeness crab were observed buried in the substrate and were judged to be moderately abundant. Several buoys, which were probably attached to "personal-use" Dungeness crab pots, were observed immediately seaward of the survey site.

The facilities would be adjacent to the mouth of a small stream located just east of Franks Creek, and divers noted a distinct surface layer of fresh water at the dive site. Although the drainage does not enter directly into the project area, the beach fringe and emergent beach grasses in the adjacent high intertidal are characteristic of alluvial high beach estuarine areas.

The classes of intertidal and subtidal estuarine wetlands identified at the site are:

Adjacent upper intertidal	Emergent wetland
Upper and mid-intertidal	Rocky shore
Lower intertidal	Unconsolidated shore (vegetated)
Subtidal	Unconsolidated bottom

A description of the substrate and marine life observed along the transect follows:

Distance Along Transect	Comments
Upper intertidal	Boulder-cobble substrate adjacent to timbered beach fringe at breakout point for the LTF. The beach area to the west was vegetated with beach grasses typical of alluvial beaches.
0 m	Transect begins at about the 3-m tidelevel, about 25 meters from the high tideline.
0 - 25 m	Cobble-boulder substrate with <u>Fucus</u> sp., <u>Mytilus</u> sp., and balanoid barnacles.
25 - 40 m	Cobble-boulder over silt and sand.
40 - 77 m	Gravel and sand over silt layer.
77 - 95 m	Bedrock outcrop rises nearly vertically from bottom; top of rock would be exposed during low tide. Subtidally, the outcrop is covered with dense growths of <u>Fucus</u> sp., <u>Mytilus</u> sp., balanoid barnacles; marine snails and limpets (<u>Tonicella lineata</u>), pargurid hermit crabs, and <u>Hallosaccion</u> sp.

Sandy silt substrate; clam siphons and Dungeness crab were abundant.

DISCUSSION AND RECOMMENDATIONS

West Face: The proposed West Face LTF meets all the environmental ATTF guidelines except S1 (Proximity to Rearing and Spawning Areas). The site encroaches on the recommended 300-ft (91m) buffer around the mouths of anadromous fish stream. Estuarine areas adjacent to the mouths of anadromous fish streams can provide intertidal spawning habitat for pink salmon, serve as feeding areas fry and smolt while acclimating to saltwater, and provide habitat for Dungeness crab.

The intertidal and subtidal areas at the site are only moderately productive. The subtidal slope is very steep. The steepness of the slope would result in a relatively small facility footprint, allowing bark debris discharged during transfer operations to be dispersed to deeper, less productive waters immediately seaward of the site.

We would have no objections to development of an LTF at this site if it could be constructed so as to maintain the recommended 91-m buffer specified in the ATTF guidelines. If the topography does not allow maintenance of the buffer, then certain mitigative measures could be considered to minimize adverse effects to fishery resources. Mitigation could include restriction of inwater log transfer operations during sensitive time periods when rearing or spawning salmonids would be in the immediate area of the stream mouth.

Franks Creek: The site was previously investigated by USFWS personnel in 1982³. At that time, the USFWS recommended that an LTF should not be constructed or operated at this site. The physical and biological characteristic reported in the 1982 survey are similar to those observed in the present survey.

The Franks Creek site does not meet ATTF guidelines S1, S6 and S7. The site is very shallow and will require a relatively long intertidal fill to reach deeper water necessary for log transfer at low tidal stages. Wetland values in the shallow cove at the LTF site would be significantly degraded by the proposed fill and bark deposition. Dungeness crab habitat immediately seaward of the proposed LTF would also be adversely impacted.

Since alternative LTF sites near Franks Creek do not seem feasible, we recommend that a low impact transfer system that would not impact associated shallow water wetland habitats (e.g., helicopter logging systems) should be implemented as a special mitigation measure to access timber in the area.

Caveats: The results of the survey represent the observations and professional judgments of the principle investigators. The

recommendations in this report are based upon observations made during a limited time period. The observations were not made over time, therefore, seasonal changes in fish and wildlife habitat use, including fish and shellfish spawning activity, may not have been observed.

The habitat assessments are qualitative and are based on underwater ocular observations of the marine benthic communities in the vicinity of the survey transect. The survey methods do not lend themselves to quantitative comparison or analysis of the affected marine resources.

Observations were generally limited to conspicuous epifaunal and attached marine plant species. Infauna and smaller components of the epibenthic community can not be readily observed or evaluated with these techniques. Although some infaunal components (e.g., clam and worm beds) can be observed and noted underwater, species identification or enumeration is usually impossible without employing other sampling methods (e.g., grabs or dredges). Therefore, these important components of the marine ecosystem are not fully evaluated or represented in this report.

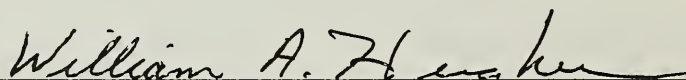
ACKNOWLEDGEMENTS

Bill Hughes (FWS-Sitka), and Carol Hale (FWS-Juneau), were the principle investigators for these field investigations and were responsible for preparation of this report. Meg Mitchell (USFS, Wrangell) was responsible for coordinating air travel, general logistics and USFS interdisciplinary concerns. Dan Barnent, Rich Mendoza and Greg Palmeri, USFS personnel, Wrangell, provided boat transportation and assisted the dive survey team.

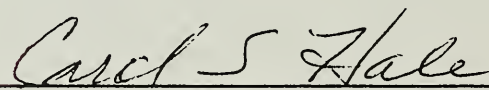
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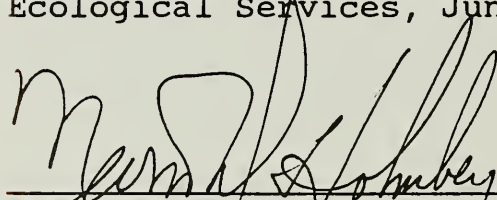
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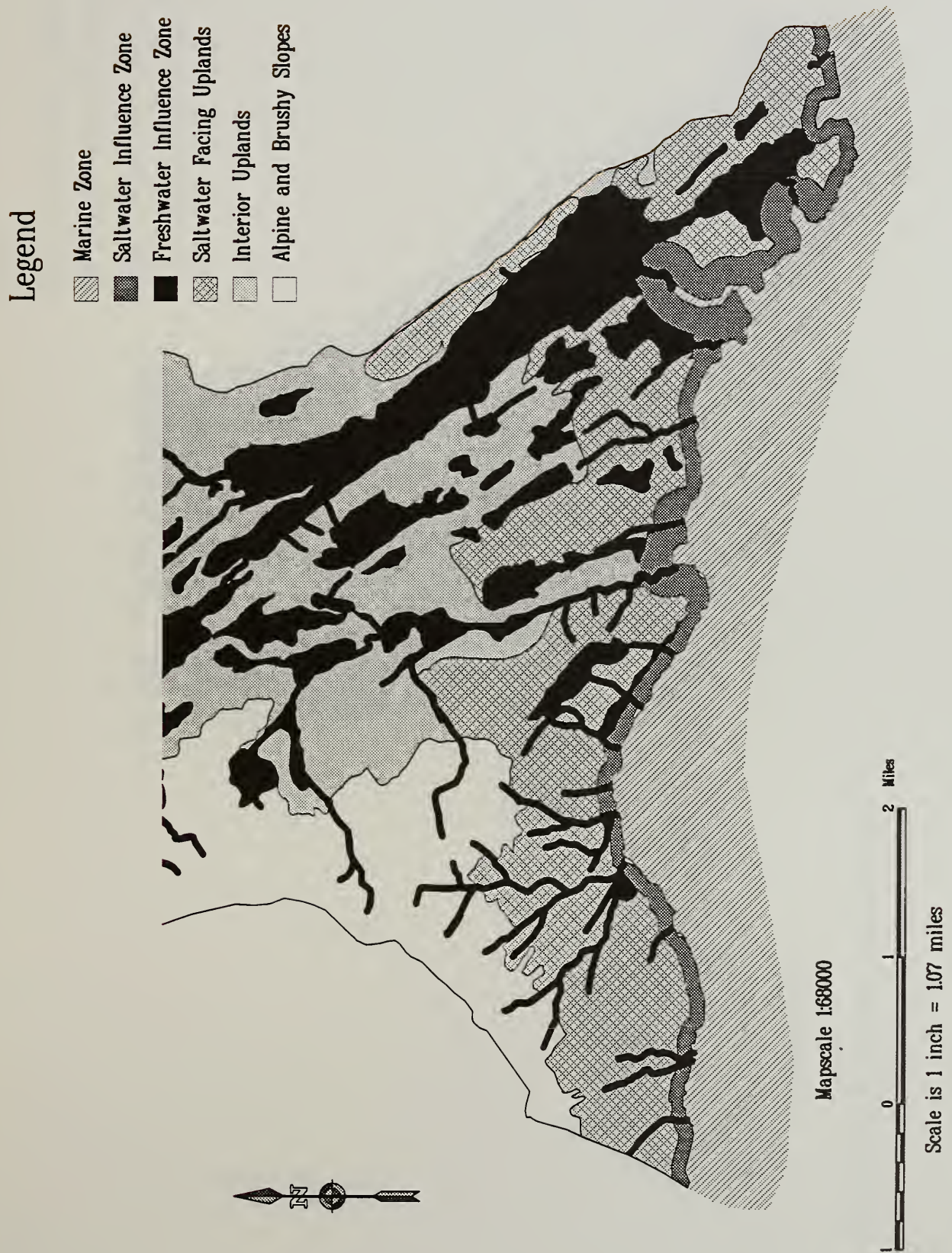


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Appendix F

Additional Maps

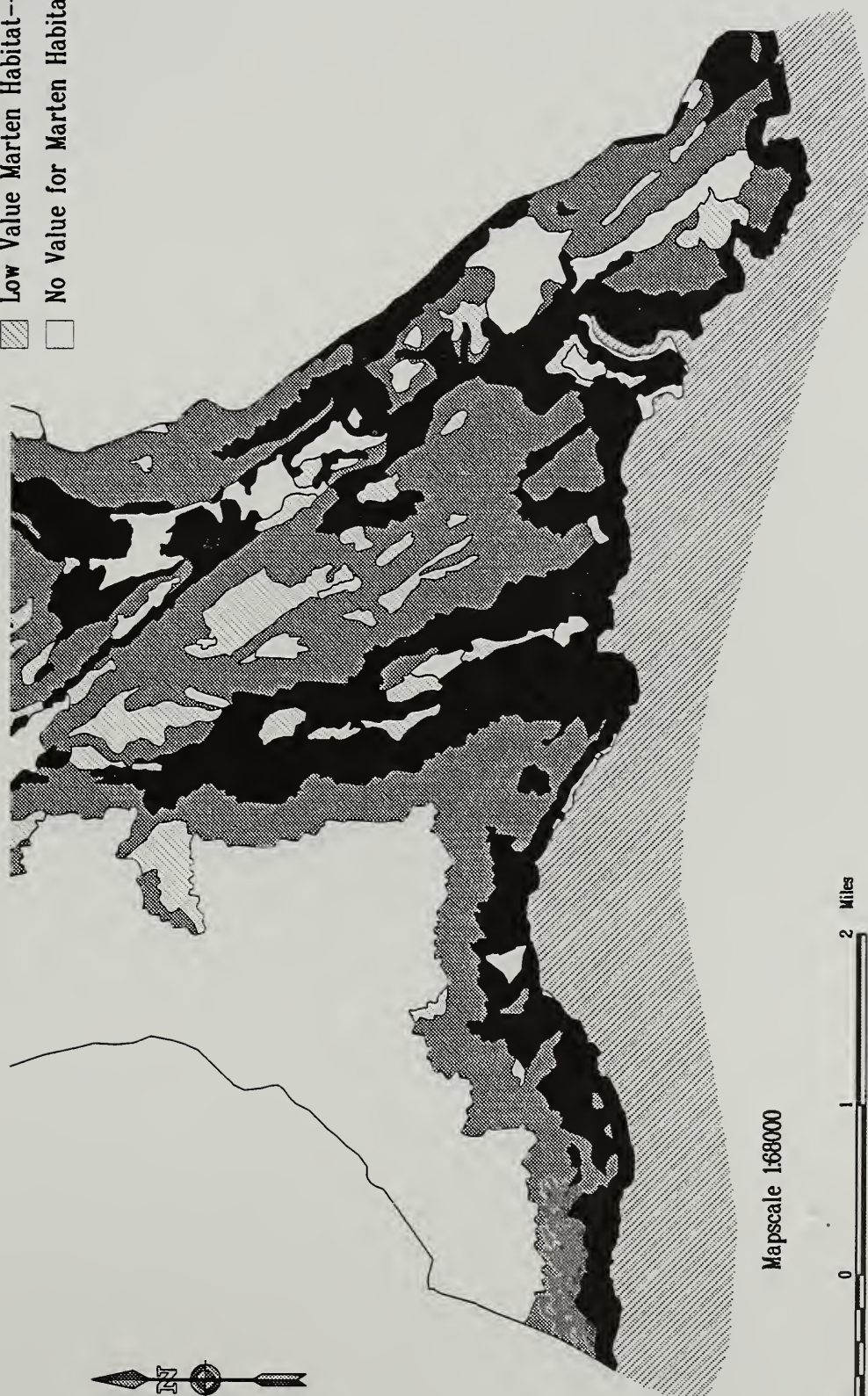
FIG. 3-12, ECOLOGICAL ZONES



MARTEN HABITAT

Legend

- High Value Marten Habitat--HSI over .66
- ▨ Moderate Value Marten Habitat--HSI .33 to .66
- ▧ Low Value Marten Habitat--HSI less than .33
- No Value for Marten Habitat



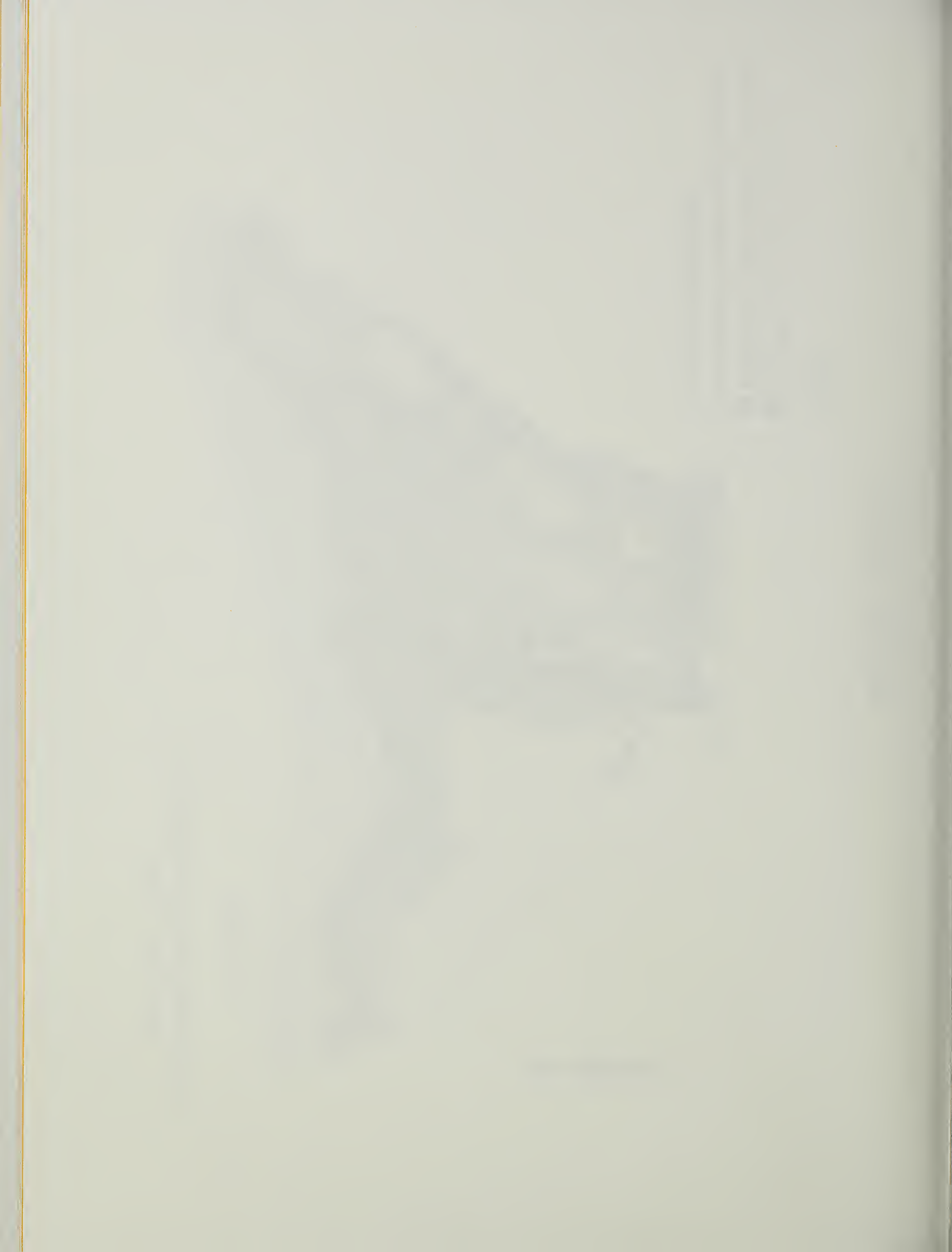
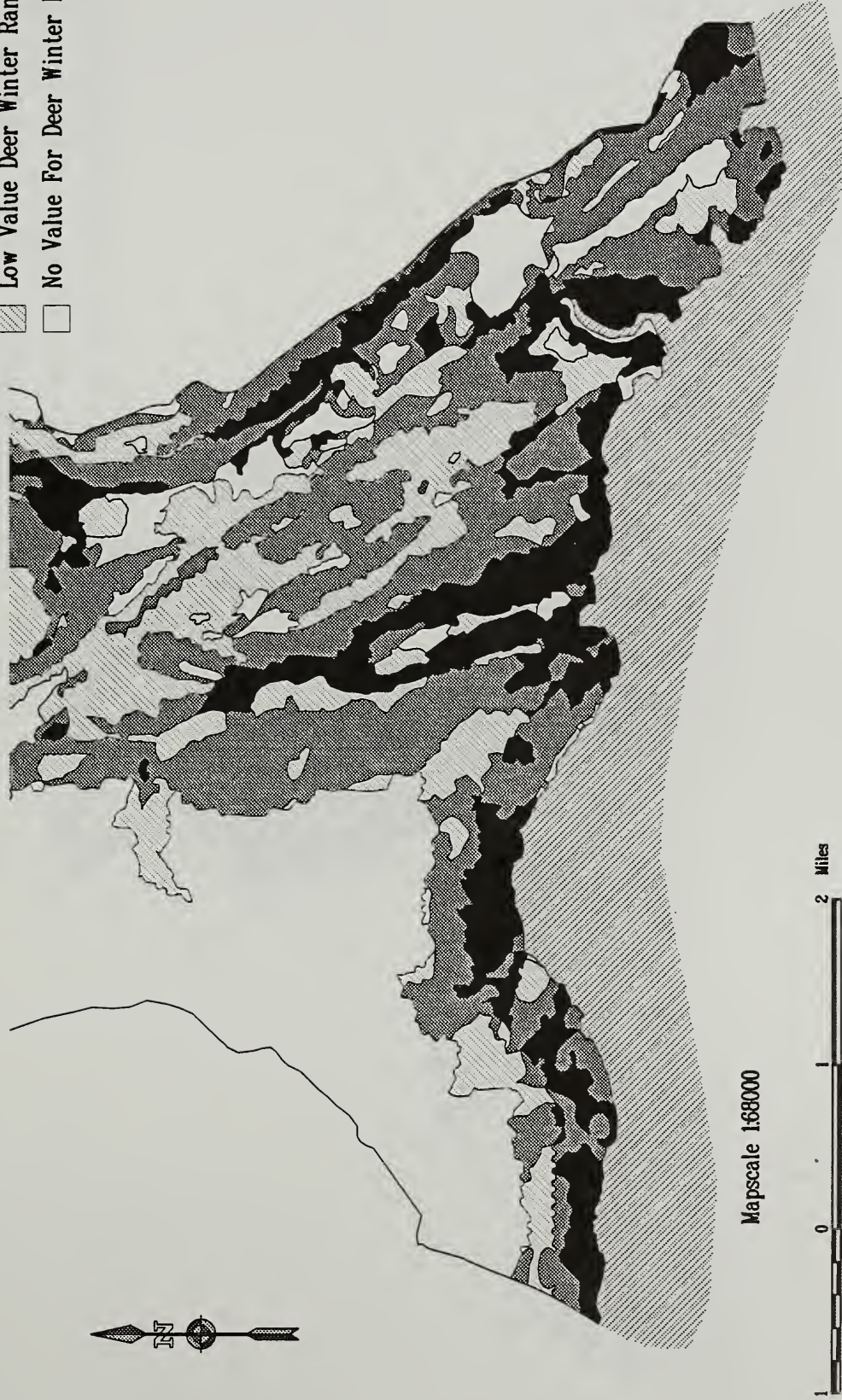
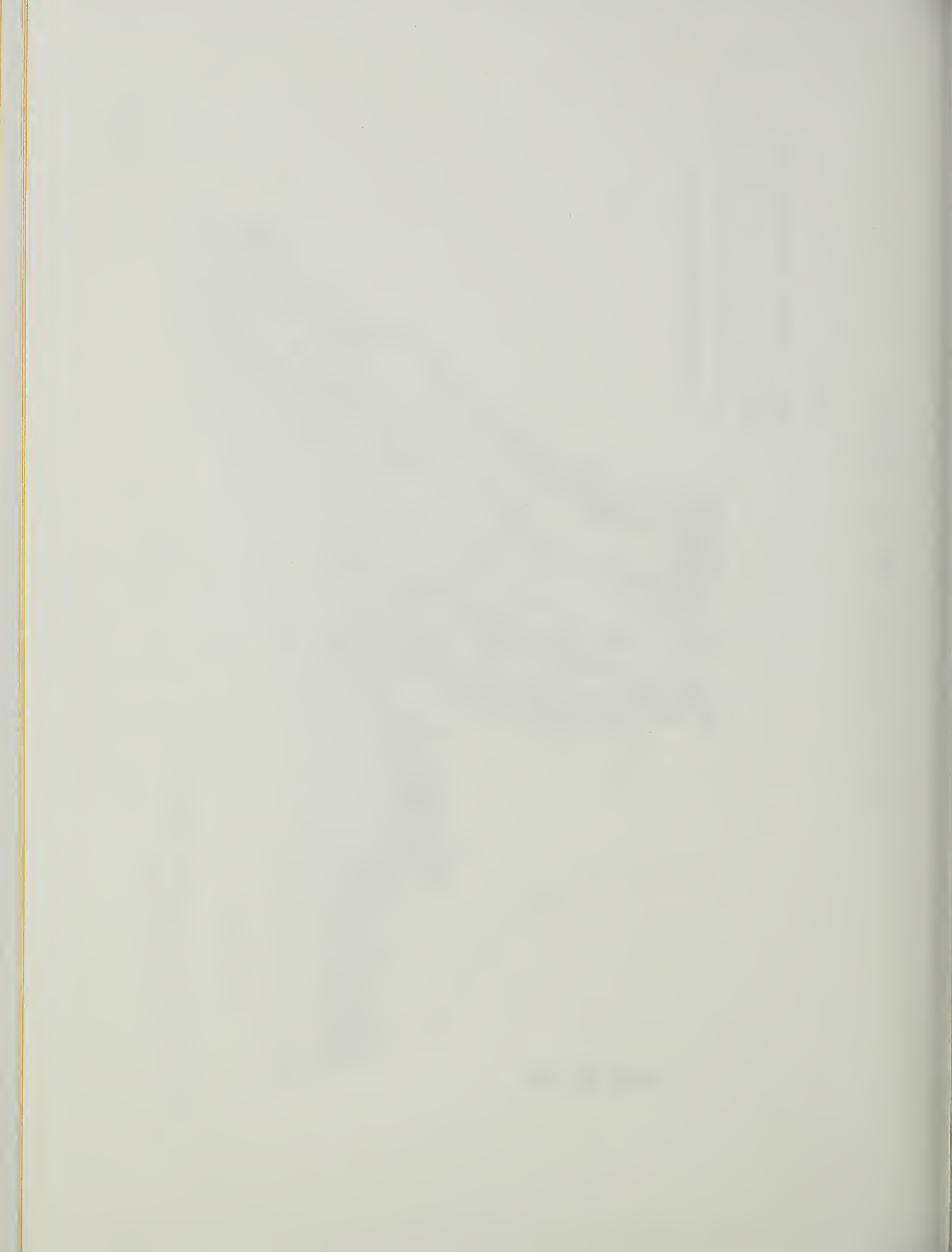


FIG. 3-15, DEER WINTER RANGE

Legend

- High Value Deer Winter Range--HSI over .42
- ▒ Moderate Value Deer Winter Range--HSI .22 to .42
- ▨ Low Value Deer Winter Range--HSI less than .22
- No Value For Deer Winter Range





HAIRY WOODPECKER HABITAT

Legend

- High Value Hairy Woodpecker Habitat--HSI over .66
- ▨ Moderate Value Hairy Woodpecker Habitat--HSI .33 to .66
- ▩ Low Value Hairy Woodpecker Habitat--HSI less than .33
- No Value for Hairy Woodpecker Habitat

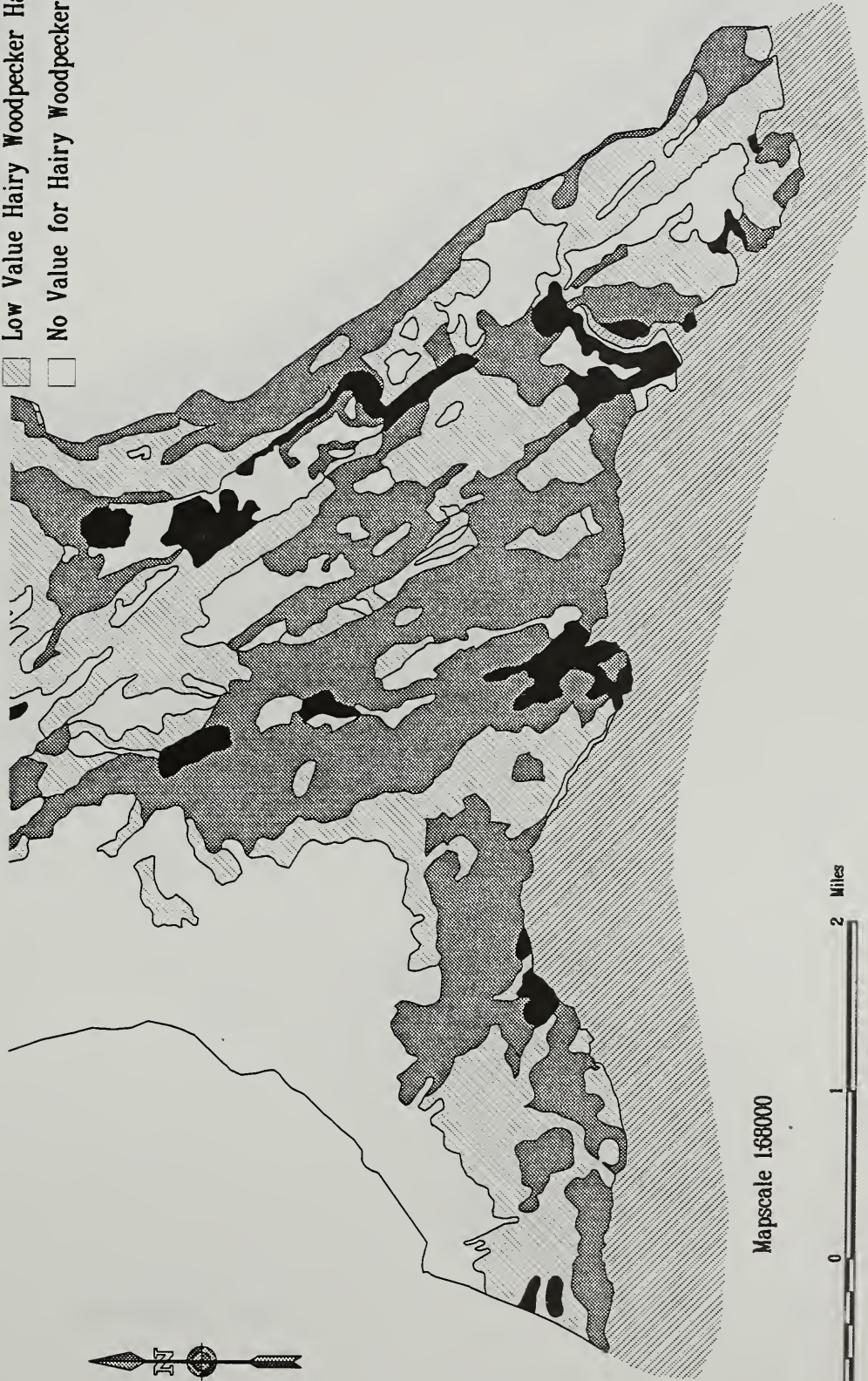


FIG. 3-16, BROWN BEAR HABITAT

Legend

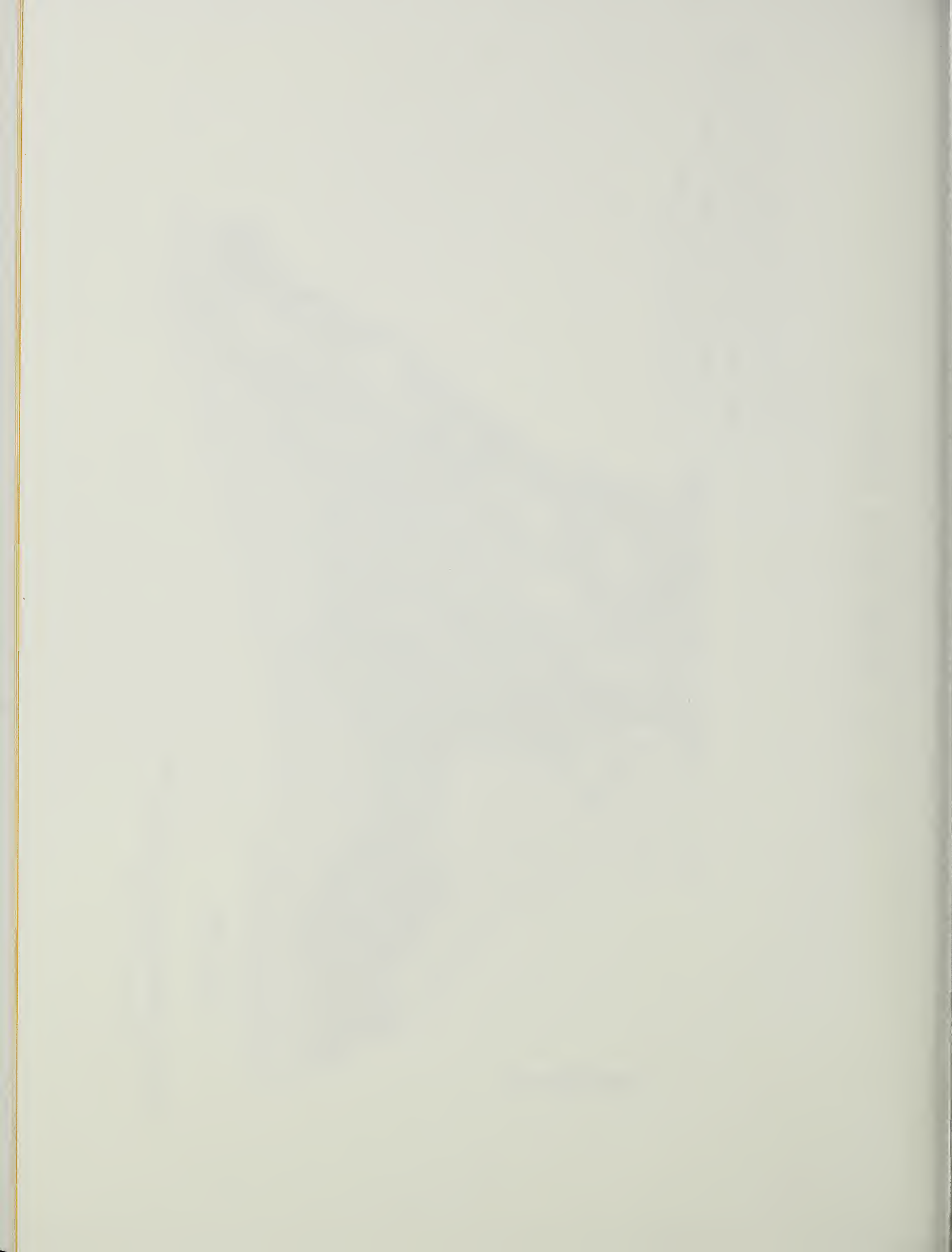
- High Value Brown Bear Habitat--HSI over .66
- ▨ Moderate Value Brown Bear Habitat--HSI .33 to .66
- ▧ Low Value Brown Bear Habitat--HSI less than .33
- No Value for Brown Bear Habitat



Mapscale 1:68000

1 0 1 2 Miles

Scale is 1 inch = 107 miles



GOAT WINTER RANGE

Legend

- High Value Goat Winter Range--HSI over .66
- ▨ Moderate Value Goat Winter Range--HSI .33 to .66
- ▧ Low Value Goat Winter Range--HSI less than .33
- No Value for Goat Winter Range



Mapscale 1:68000



Scale is 1 inch = 1.07 miles

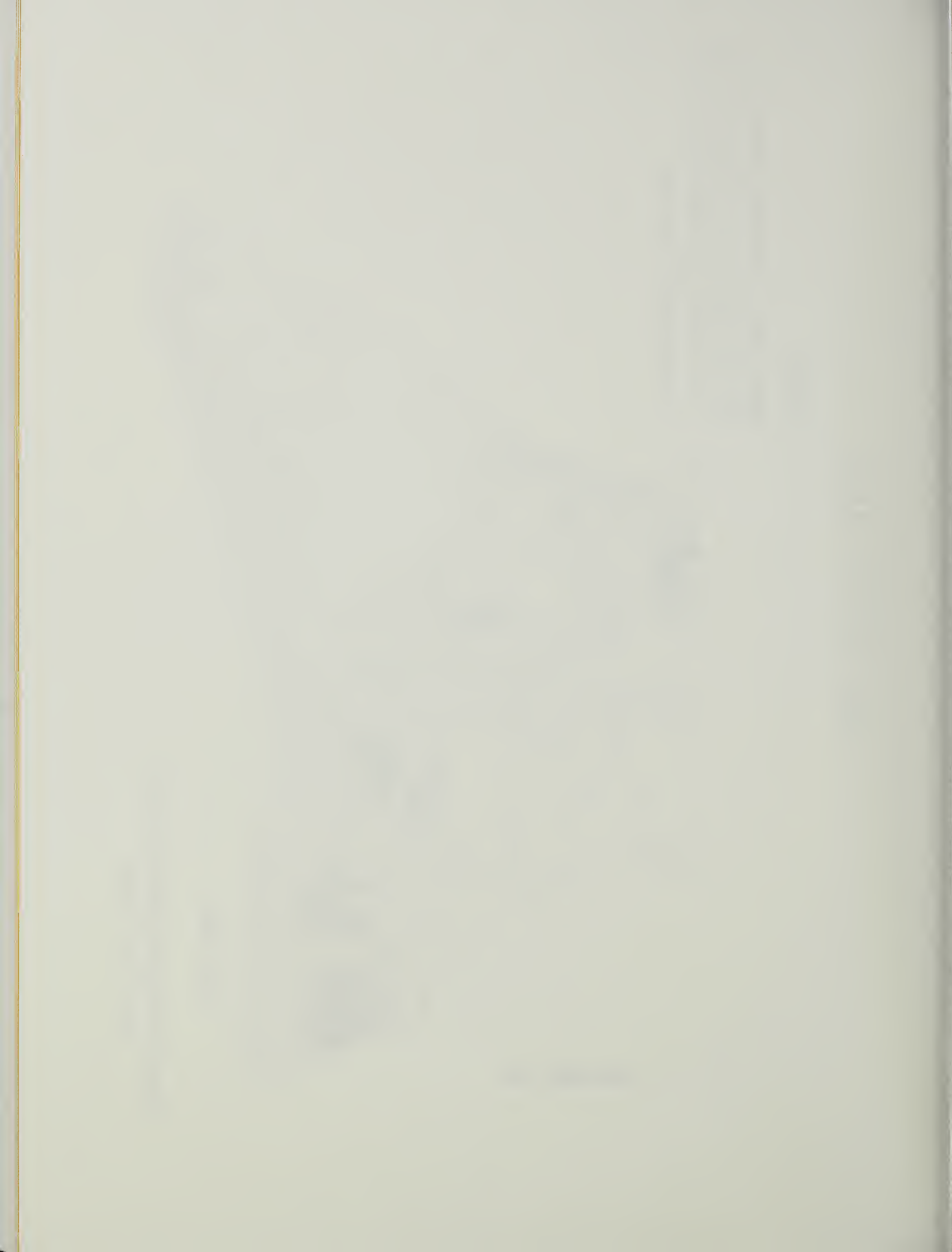
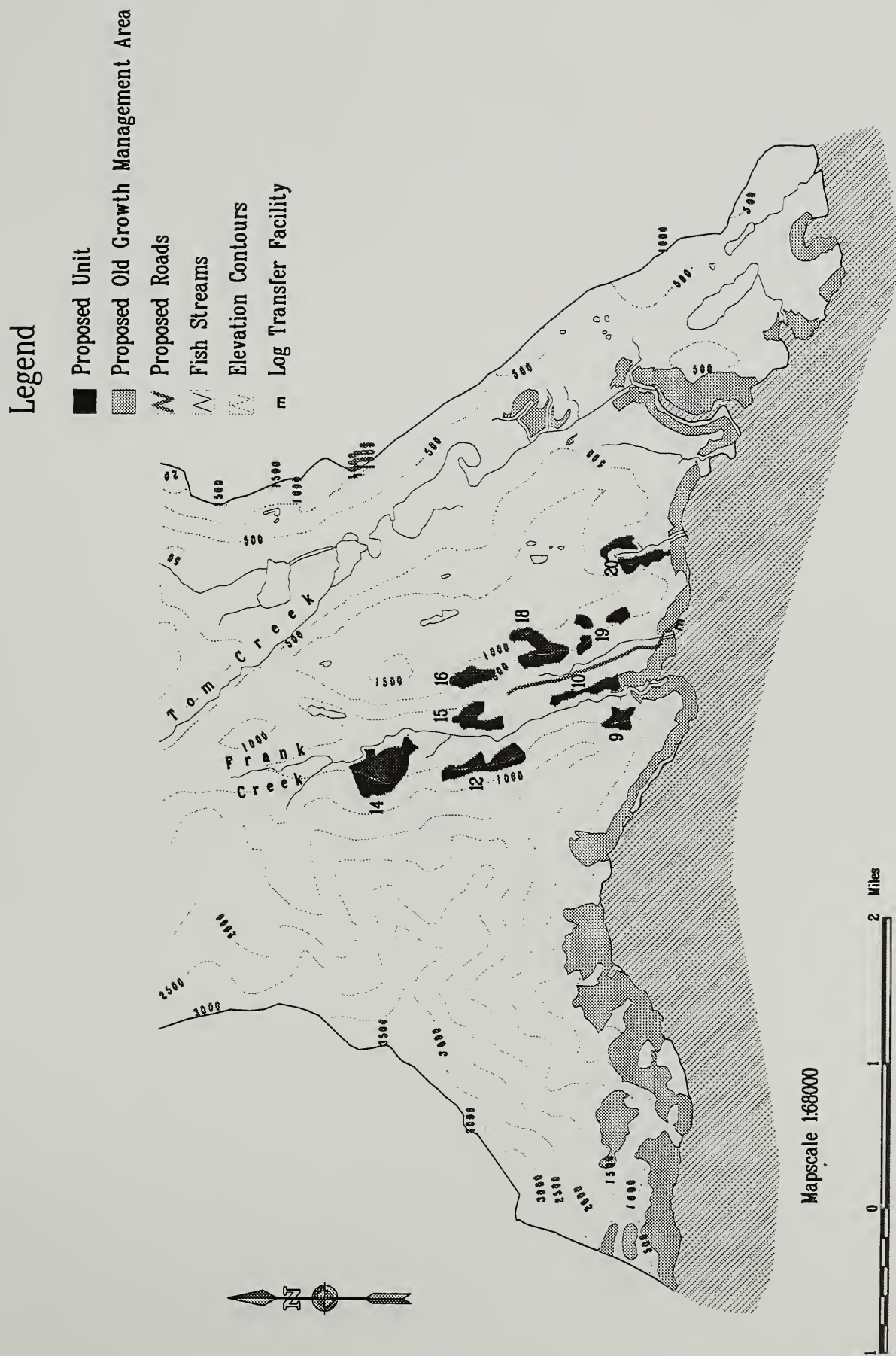


FIG. 2-1, ALTERNATIVE B



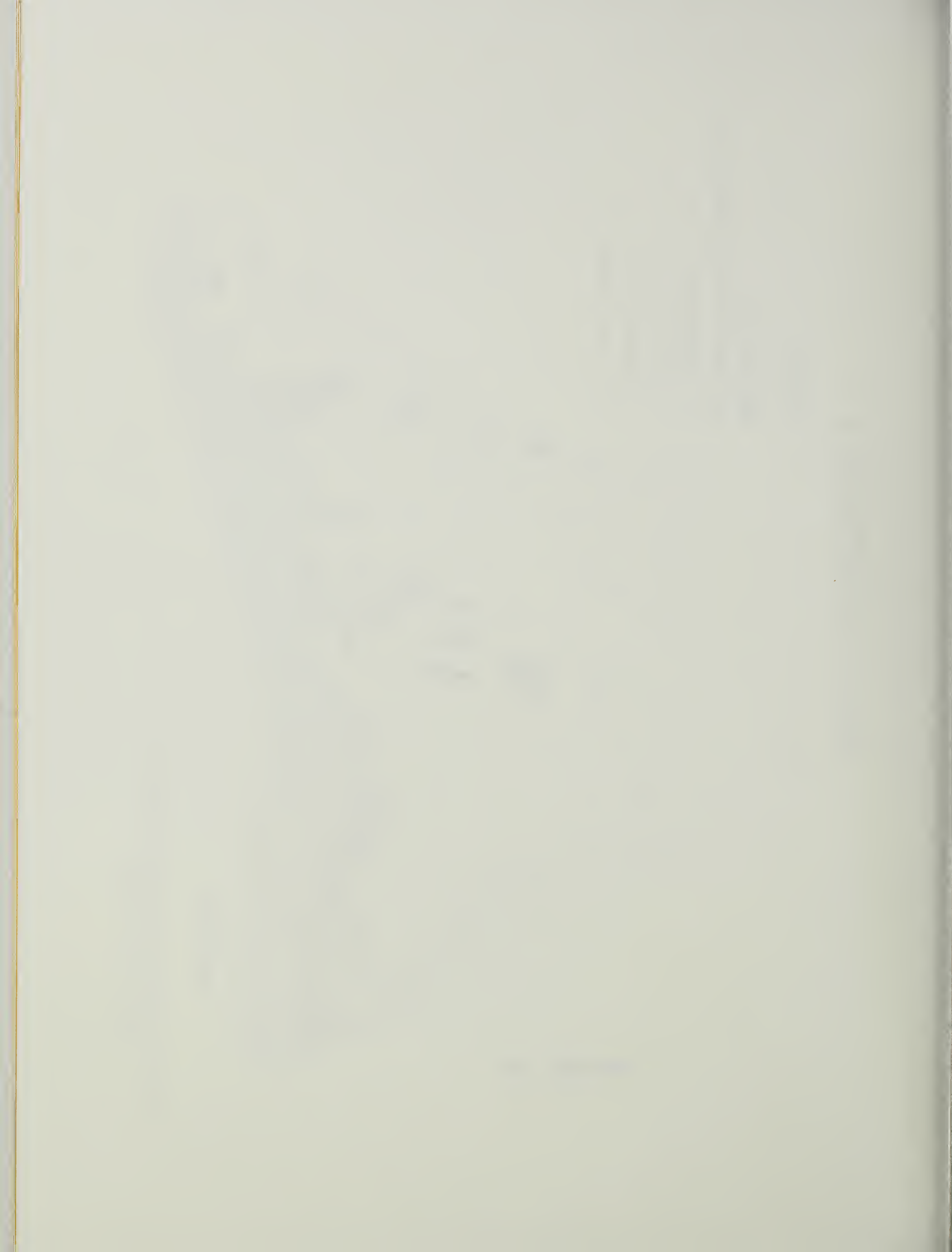


FIG. 2-2, ALTERNATIVE D



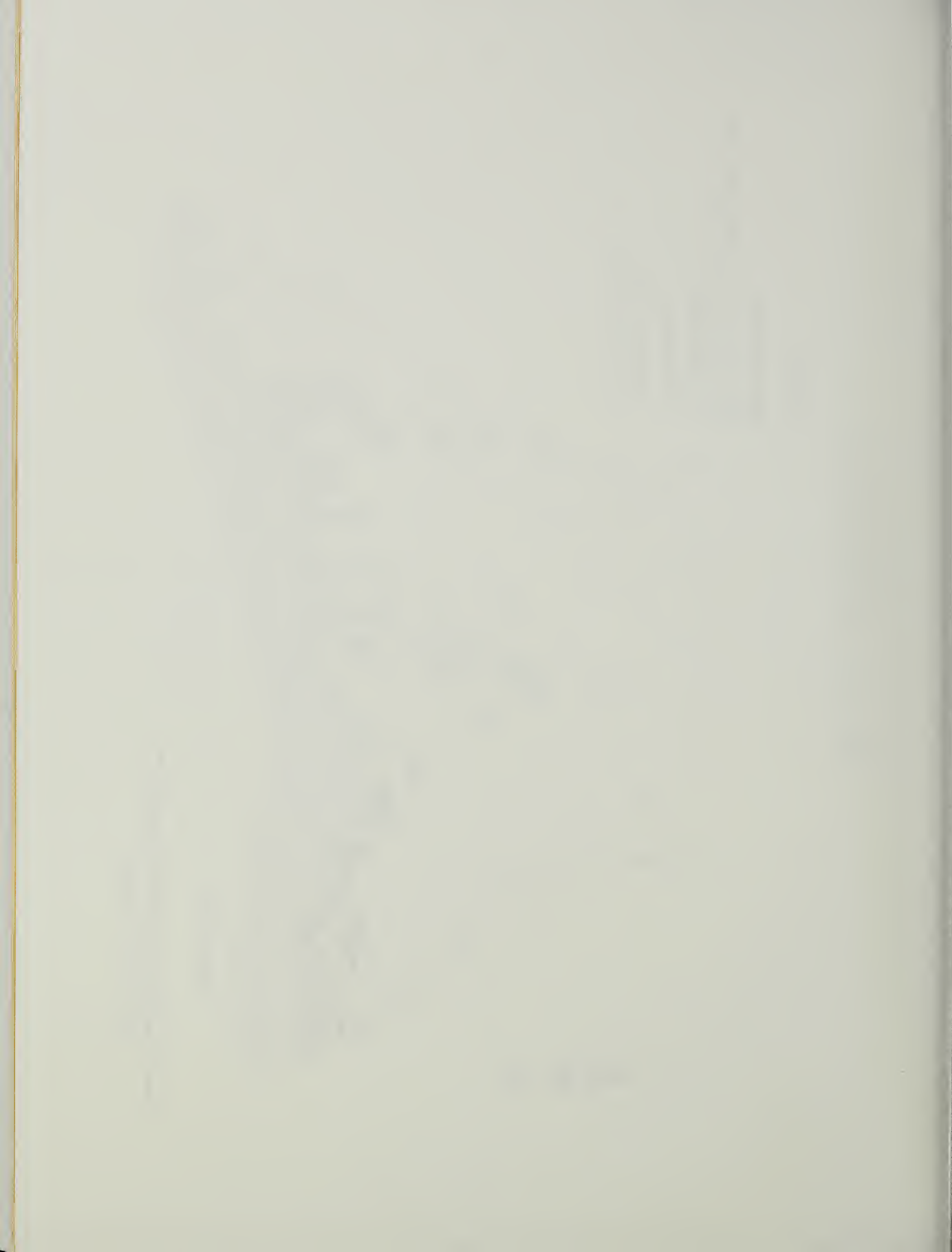


FIG. 2-3, ALTERNATIVE E

Legend

- Proposed Unit
- ▨ Proposed Old Growth Management Area
- Proposed Roads
- ~ Fish Streams
- Elevation Contours
- m Log Transfer Facility



Scale is 1 inch = 1.07 miles

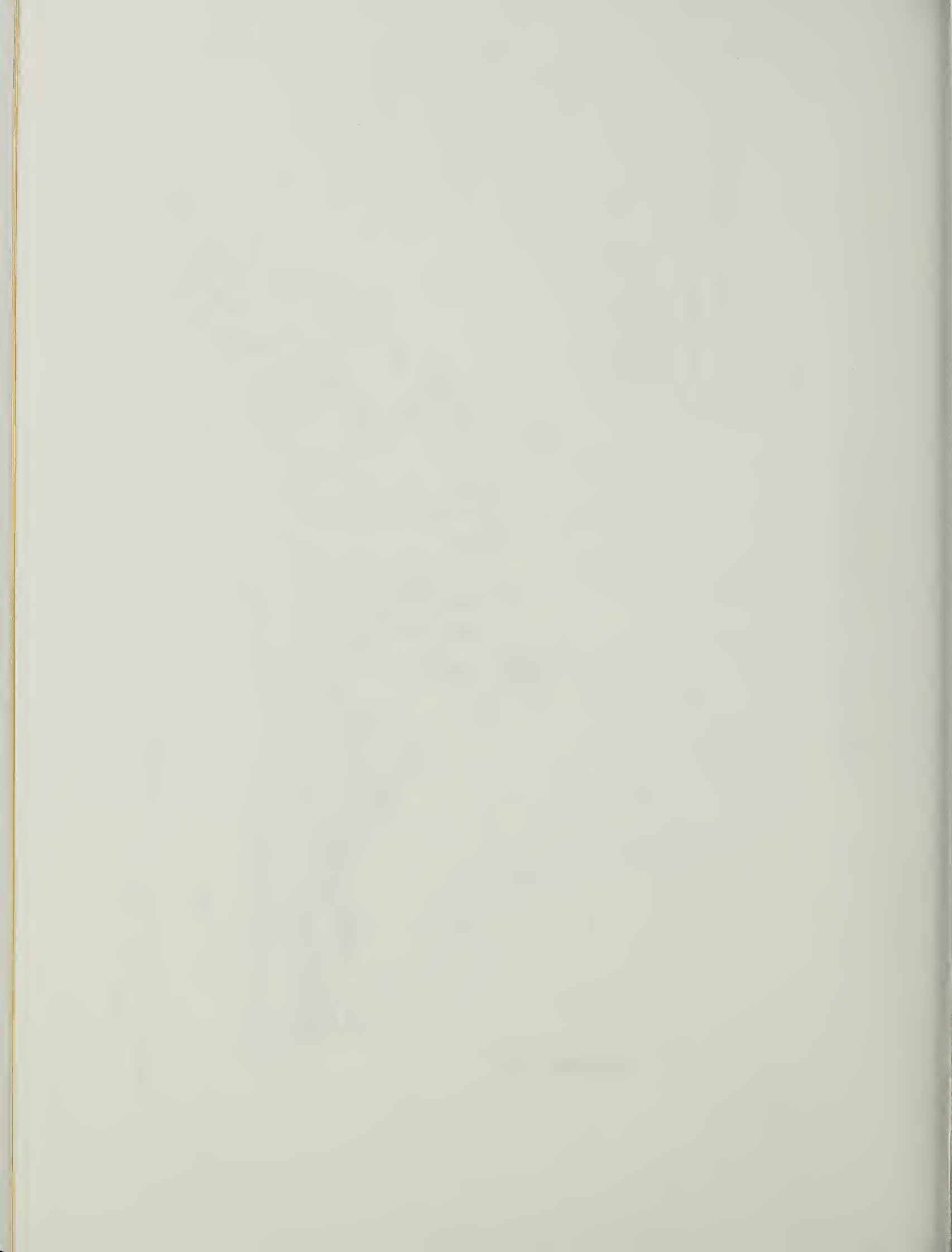


FIG. 2-4, ALTERNATIVE F



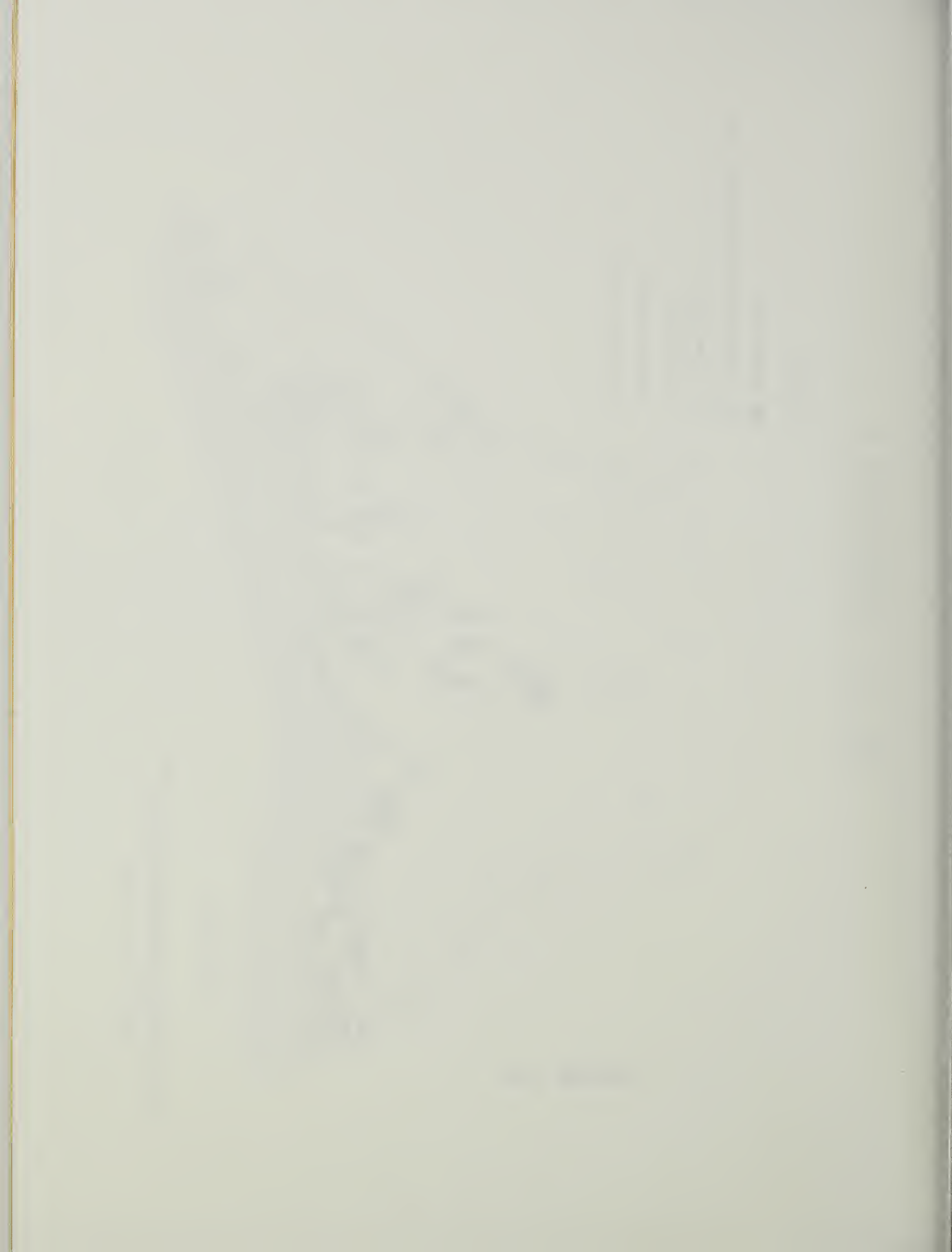
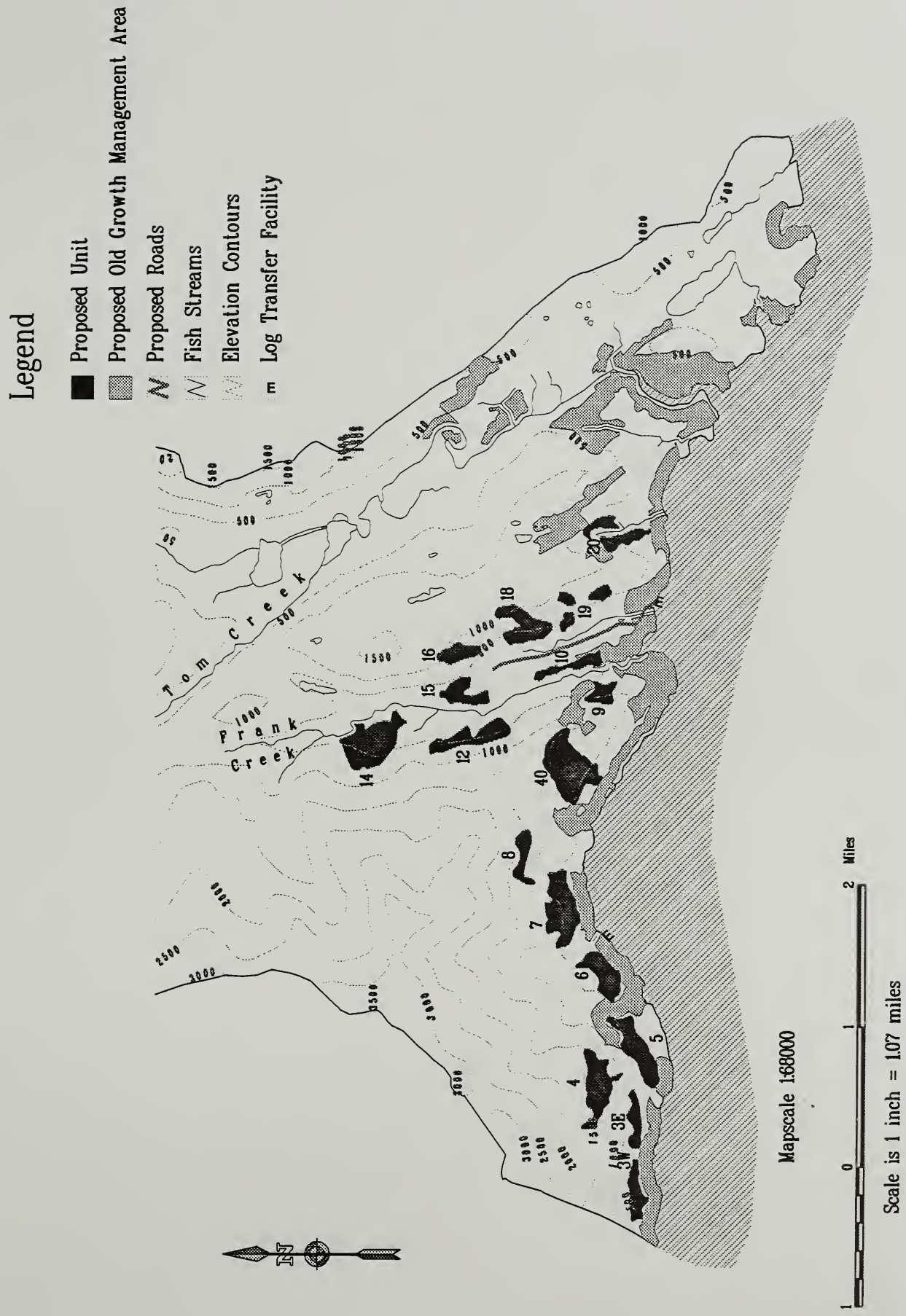


FIG. 2-5, ALTERNATIVE G



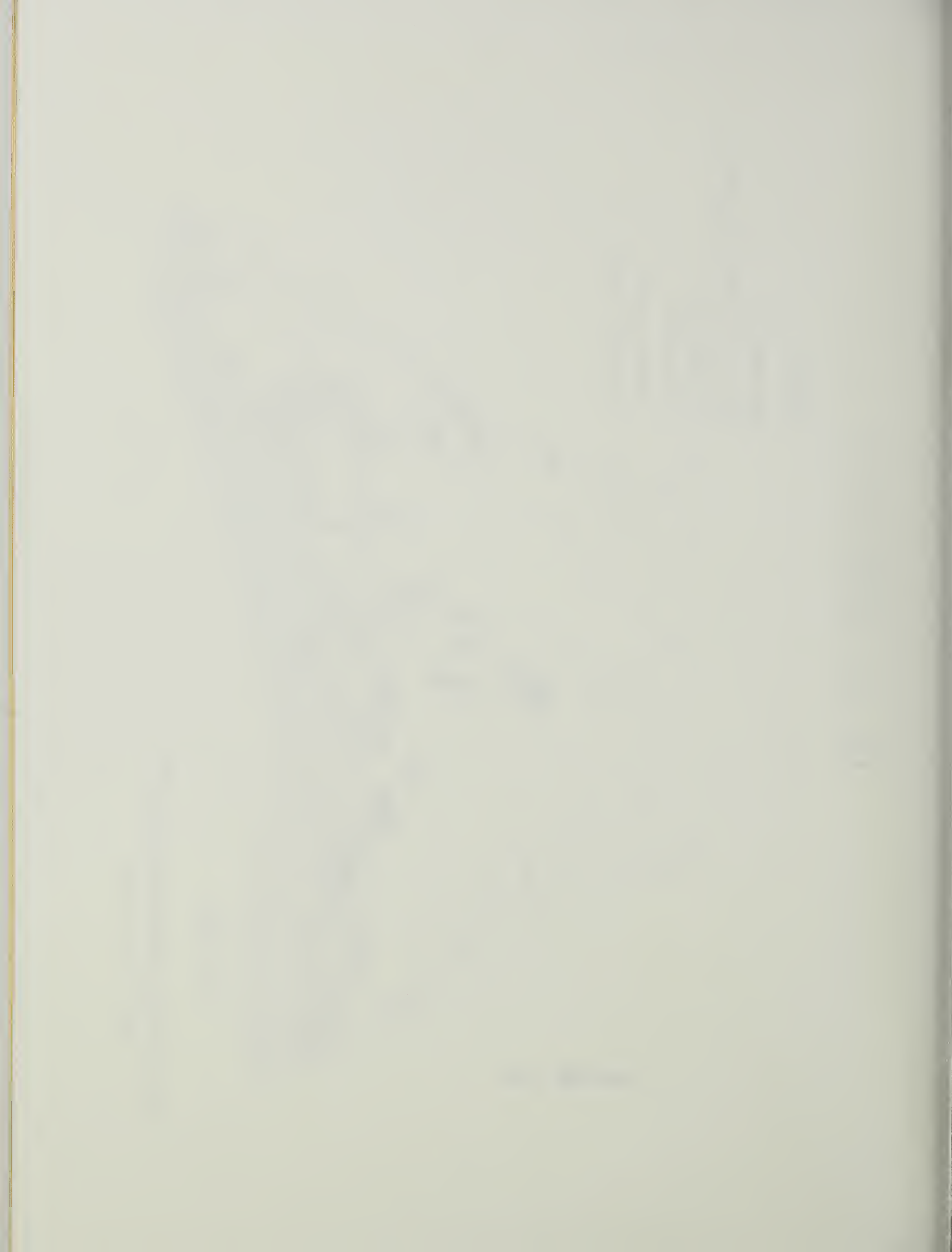
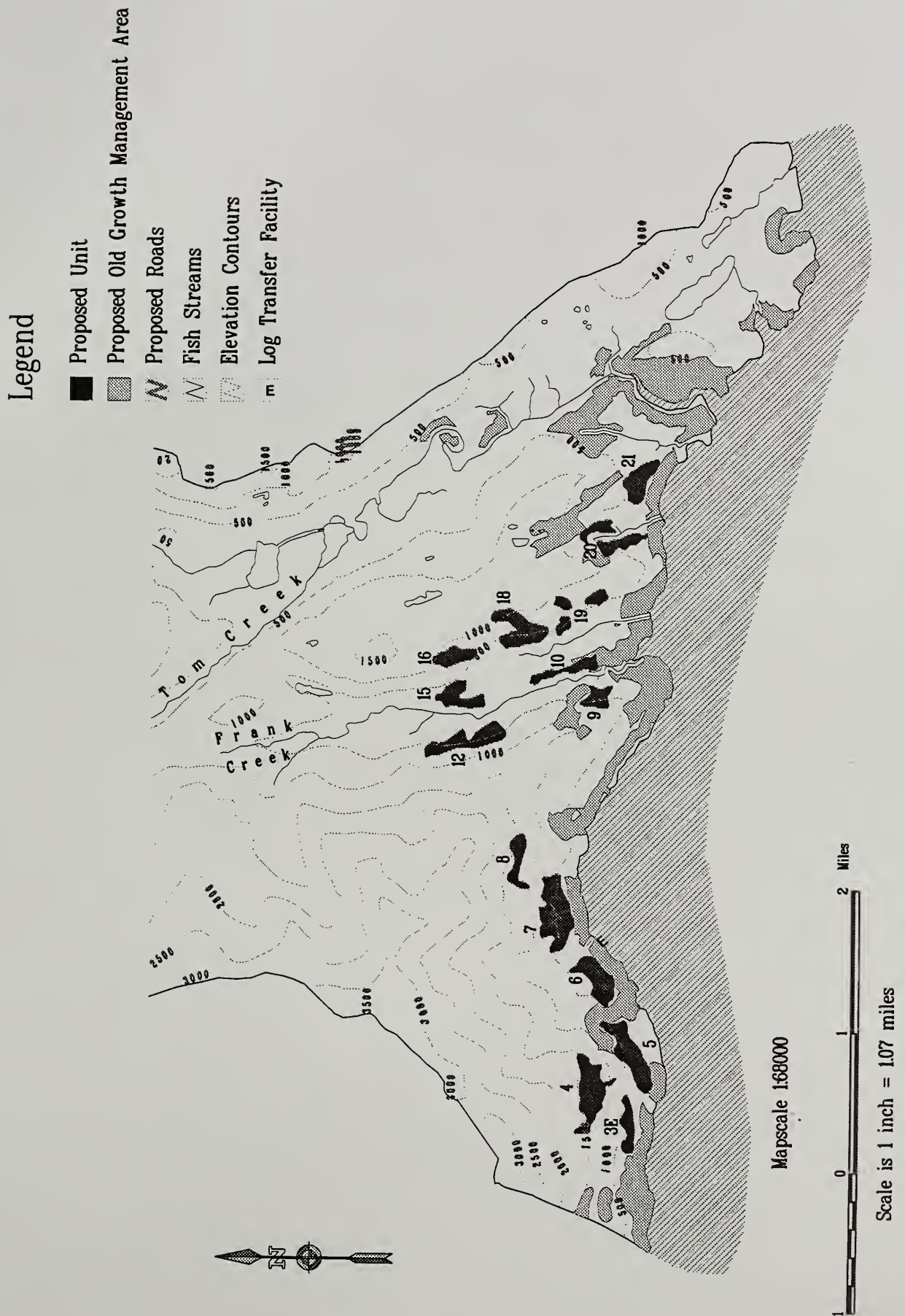


FIG. 2-6, ALTERNATIVE P



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